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An exploratory study of Behavioural Finance insights in the Small, Medium and Micro-Enterprise creditworthiness assessment process

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ABSTRACT

The development of the SMME sector is critical to general economic development in South Africa. Financial constraints are often cited amongst the leading factors hindering progress. Financial institutions are often reluctant to lend to smaller entrepreneurs due to perceived information asymmetry and lack of available collateral. At the nascent and new entrepreneurial levels, it is generally more difficult for loan applicants to provide the information required to secure the necessary funds. Inadequate financial information coupled with uninformative credit histories heighten the information opacity thus diminishing the entrepreneur's prospects of securing loan funding. Viable entrepreneurial projects may therefore remain unfunded largely due to uncertainty rather than riskiness. This study therefore highlights the creditworthiness assessment process and seeks to address the information opacity problem by looking to alternative sources of entrepreneurial information that may aid the loan officer.

Recent investigations in the field of Behavioural Finance have addressed several aspects of entrepreneurial behaviour and decision making. Insights into entrepreneurial risk propensity and the impact of certain specific cognitive biases and heuristics have developed. These insights may be of particular usefulness to financial institutions that are currently relying on insufficient or uninformative creditworthiness information. However, these alternative creditworthiness insights have not been sufficiently explored, particularly in South Africa. In addition, Behavioural Finance insights have not been adequately investigated within the context of entrepreneurial lending. This study both proposes and then investigates the usefulness of alternative forms of creditworthiness information – primarily Behavioural Finance insights. Fifty SMME loan applicants answered several internet based business case studies as part of a loan application process. The presence of cognitive biases and heuristics amongst the entrepreneurs that emerged were then correlated against currently available creditworthiness information. Entrepreneurs that were found to be more risky based on this externally available creditworthiness information were often also found to exhibit a tendency to irrational decision making. The study also demonstrated that Behavioural Finance insights that are useful to the creditworthiness assessment process can be generated in a commercially viable manner. In addition, marked differences in the tendency to rational decision making were identified when comparing nascent to more established entrepreneurs. This finding emphasizes the importance of segregating the applicant data pools. Effective assessment of entrepreneurial decision making is best achieved when contrasted against information derived from comparable entrepreneurial sources. The findings serve to advance both Behavioural Finance and Banking theory. In addition, through the origination and exploration of Behavioural Finance insights in the creditworthiness assessment process, a practically useful commercial methodology has been brought to the fore than offers promise in the SMME finance sector.

Chapter 1 – Introduction: Credit Constraints and Bank Lending Technologies

1.1 A background to the current SMME finance debate

The development of Small, Medium and Micro Enterprises (SMMEs) in the South African economy is vital as a vehicle for stimulating GDP growth, job creation and skills development. To address this, an increase in the supply of financial and non-financial support was earmarked as a critical strategic objective (White Paper on national strategy towards the development and promotion of small business in South Africa, (1995); and the National Small Business Act (1996)) and the results monitored. However, the response from the 'big four' banks were generally found to be inadequate (Schoombee, 2000), which is telling as they account for over 90% of lending to South African businesses (Okeahalam, 2001).

The reasons for the limited success in extending and growing credit services in the SMME sector are subject to diverse and opposed explanations. The consensus amongst banks is the lack of financial and managerial skills (Schoombee, 2004; Global Entrepreneurial Monitor (GEM), 2003) as well as unclear business plans (Berry, von Blottnitz, Cassim, Kesper, Rajaratnam, van Seventer; 2002). In corroboration, an estimated 50% of start-up businesses fail in the first years of trading (Ladzani and van Vuuren, 2002). Moreover, Brink, Cant and Ligthelm (2003) maintain that between 70% and 80% of small businesses ultimately fail. By way of contrast, many argue that finance supply is insufficient in quantity, unfairly allocated, overly costly and linked to unattainable conditions, notably collateral requirements (Turner, Varghese, Walker; 2008). A survey of Gauteng based entrepreneurs revealed that around 50% had difficulty in obtaining finance or credit (Ligthelm and Cant (2003)).

Several recently published research papers have investigated the impact of increasing the supply of finance in the SMME sector. The findings of two recent

studies in Mexico (McKenzie and Woodruff, 2008) and Sri Lanka (de Mel, McKenzie and Woodruff, 2008), where small loans were granted to randomized microenterprises and high returns on capital were yielded, further emphasised the positive impact that can be made. Research efforts have branched out to positing methods to increase SMME access to finance. Suggestions include the promotion of an enabling environment, large scale downsizing of application efforts and a methodology to facilitate the creation of SME credit histories (Nenova, Thiora Niang, Ahmad; 2009), as well as a rethinking of the manner in which loan guarantee funding and monitoring methodologies are performed (Maroshegyi, Gyula Nagy; 2010). de Mel, McKenzie and Woodruff (2011) found that a relaxation in the financial institution's application requirements could positively increase both the demand and supply of finance to SMMEs.

The determination of creditworthiness is challenging to both lenders and borrowers. In essence, the lender must be able to assess if an SMME loan applicant has the ability to efficiently repay the loan utilising the profits of the business. This assessment takes place in an SMME market, which is generally characterised by inexperience and limited in financial ability (Olawale and Van Aardt Smit (2010)). Consequently, the lending technologies applied in a traditional lending environment may not be appropriate and specific lending technologies should be assessed.

1.2 Current bank lending technologies

Lenders seek cost effective assessment technologies that can assimilate information on loan applicants to correctly assess creditworthiness, reduce the incidence of incorrect credit rationing, lower borrower and lender transaction costs, and manage loan default rates to ensure financial viability (Hoff and Stiglitz, 1990). Berger and Udell (2006) set out the lending technologies used by financial institutions to assess a loan applicant. Among them, and most relevant to this research are Financial Statement Lending, Small Business Credit Scoring ('SBCS') and Relationship Lending. In addition, collateral is a fundamental requirement underpinning most bank lending decisions.

Financial Statement Lending

Financial statement lending is based primarily on the strength of the applicant's financial statements. This methodology incorporates a due diligence and ratio analysis to varying extents. Recent findings suggest that large banks tend to base their lending decisions more on 'hard' financial ratios than prior relationships (Cole, Goldberg and White, 2004).

Small Business Credit Scoring

Small Business Credit Scoring ('SBCS') is based primarily on hard information about the SME owner and the firm. It involves an analysis of consumer data about the owner (typically gleaned off reports from consumer and commercial credit bureaus) combined with relatively limited data about the firm itself. The probability that the applicant will default or become delinquent is measured. These details are loaded into a loan performance prediction model which yields a score based upon which the loan will be considered. This technology is generally associated with smaller, relatively risky loans i.e. loans with a higher probability of not being repaid due to inadequate generation of cash flows.

Relationship Lending

Relationship Lending relies primarily on 'soft' information gathered over time. The lender has direct contact with the firm and observes its performance at several levels. Small banks seem to tackle the opacity problem using relationship lending based on 'soft' qualitative information gathered through contact over time with the firm, and often with its owners and managers. It allows informationally opaque small businesses that do not have strong financial ratios, collateral or credit scores to obtain bank financing by augmenting the weaker 'hard' information with 'soft' information learned by the bank over time (Berger and Udell, 2002).

Collateral Demands

Where the bank cannot arrive at a creditworthiness decision by screening the firms or projects to be financed utilizing the available lending technologies at a viable cost, banks will almost inevitably resort to collateral. 60% of small business loan value in the United States is guaranteed with personal assets of the owners (Whiteman, 1998

[as cited by Cole, Goldberg and White, 2004]). The proportion is even higher in developing economies (Manove, Padilla and Pagano; 2001).

1.3 Shortcomings of the current bank lending technologies

Financial Statement Lending

Financial Statement Lending can only be utilized for relatively transparent entities i.e. companies that are able to accurately disclose their results in a manner that conforms to generally accepted practice. Finscope 2006 findings (presented by the Finmark Trust) reveal that between 8% of Business Sophistication Measure ('BSM') 1 firms and 93% of BSM 7 firms keep some form of financial records. Common departures from recommended practice include lack of reporting detail, non-compliance with IFRS, irregular reporting of results and submission of unaudited annual financial statements. This information is in turn compromised by the SME borrower's tendency to skew the information presented to better portray the financial situation (von Blottnitz; 2009). Indeed, financial institutions are more likely to lend to SME owners who can demonstrate superior financial control and reporting (McMahon; 1998a). The ability to provide accurate, reliable and timely financial information, while commendable, is not necessarily an indicator of the firm's prospects of repaying the loan. Higher accounting sophistication was found to have little impact on the loan officer's credit assessment process though it did impact on the cost of the loan (Cassar, Ittner, Cavalluzzo, 2010).

Small Business Credit Scoring

The generation of an informative credit score is dependent on the gathering of relevant historical information about the applicant. The lack of credit history of many applicants may prove a hindrance since many young or new entrants into the credit market will have little data with which an accurate credit score can be compiled. Less than fifty percent of the South African adult population have an active credit file with banks and providers of retail credit (National Credit Register, 2010). This is particularly true of black applicants, many of whom were less likely to successfully access credit in the apartheid period (Schreiner, Graham, Cortes-Fontcuberta, Coetzee, Vink; 1996) and since (Finscope, 2005). The accuracy of a credit scoring

system is also dependent on the care with which it is developed and maintained. If the applicant pool increases the bank must ensure that the new pool of applicants behaves similarly to the pool on which the scoring model was built. If not, the failure prediction capabilities will be less reliable. This may be particularly true of the South African credit market where the credit histories of many new entrants in a post-apartheid emerging economic climate differ from borrowers of the past both in terms of quantity of information and spending patterns. Shifts in the economic climate must also be factored into a successful scoring model. The recent recessionary climate has exacerbated the incidence of loan defaults making comparative analysis difficult. Furthermore, where little relevant information is available on large groups of people, it is inevitable that individuals within these groups will be denied access to credit until more information can be gathered on the group as a whole.

Overreliance on SBCS may result in the possibility of banks abandoning other evaluation tools that yield alternate credit data – this may result in an exacerbation of the opacity problem. Where SBCS is the primary lending technology, it is likely that many applicants are denied credit due to a dearth of suitable and informative creditworthiness information.

Relationship Lending

Lending constraints should theoretically diminish as the bank – borrower relationship matures and the level of information opacity decreases. Collateral requirements are lessened when the bank is able to reduce the information gap between lender and borrower (Berger, Espinosa, Frame and Miller, 2007) though Degryse and Van Cayseele (2000) had previously found the decrease to be marginal. It is considerably difficult to transmit this soft information about the firm through the various management layers or to pass it on to succeeding loan officers (Berger and Udell, 2002). Where the length of the bank – borrower relationship is brief, the difficulty in integrating the soft information is exacerbated making collateral demands more indispensable to the bank.

Collateral Demands

The normative balance should be one where banks use collateral to correct moral hazard problems yet avoid excessive reliance on collateral. Younger, smaller firms

are known to be relatively more constrained by collateral requirements (Lewis, 2002; Bigsten et al, 2003). Since the neediest SMMEs are in fact smaller and newer (Trade and Industrial Policy Strategies; 2002) and thus beginning their relationship with the bank, it is unlikely that dependence on collateral will decrease, all other factors being equal. This dependence results in banks becoming less motivated to evaluate the profitability of projects, rather resting on high collateral levels. This is unfortunate given the bank's high levels of experience in many sectors and markets. They may be more familiar with aspects of a venture than the firm owners who often overestimate the profitability of their own projects (De Meza and Southey; 1996). Consequences of collateral policies are that collateral is posted by the wealthier entrepreneurs resulting in funding of their good and bad projects. Screening would separate the riskiness of the borrowers from the quality of their projects. The effect of over-reliance on collateral is over-funding of projects that are not worthwhile due to under-screening of investments (Manove et al; 2001), while simultaneously overlooking potentially worthwhile projects due to unfamiliarity with a significant portion of the market.

1.4. Lending technologies and the increase in credit supply

1.4.1. Advances in creditworthiness lending technology

It is not clear which of the three lending technologies (Relationship based lending, Financial statement lending and Small Business Credit Scoring) discussed in this research undertaking would be best suited to achieve the goal of increasing the supply of SMME finance. The major constraints to lending include:

- the information opacity obscuring a definitive view of the borrower's financial position (hindering financial statement lending),
- the lack of new entrants' credit history (hindering SBCS), and
- the lack of prior exposure to new entrepreneurs (hindering relationship lending).

Despite these difficult circumstances, for the bank to increase the flow of funding to the SMME market, the bank must somehow screen applicants to differentiate those

entrepreneurs that exhibit creditworthy traits from those that don't. A number of recent studies have investigated more effective methodologies to decide on creditworthiness using the existing data available (e.g. Yu, Wang and Lai, 2009; Abdou, 2009) as well as the usage of alternate forms of information in the creditworthiness assessment process. The use of psychometric testing tools as part of the screening process has emerged to a limited extent over the past year (Winter, 2010). Finlay (2010) demonstrated that models that include continuous financial behaviour i.e. factoring in information about the lenders prior decision making criteria, consistently outperform models based only on classification approaches (binary classifications such as good payer / bad payer). Sohn and Jeon (2010) proposed an alternative risk model to predict default particularly in technology firms based on a combination of insolvent debtor and insolvent company default criteria. In searching for alternative sources of information on creditworthiness, Cassar et al's (2010) study found that firm age and legal liability impacted the loan decision within the context of the other information that was available to the loan officer.

1.4.2 Creditworthiness uncertainty

The positive developments mentioned have contributed to the creditworthiness assessment process, but further SMME entrepreneurial specific insights are needed, particularly if they can directly support the existing lending technologies to circumvent the uncertainty remaining when screening newer entrepreneurs. Uncertainty in this context is defined as lack of knowledge for decision making (Duncan, 1972). Alternative sources of information that can reduce the uncertainty that pervades the creditworthiness assessment will be analysed, proposed and then investigated. Specifically these will be analysed within the three most prominently used lending technology categories i.e.

- SBCS: Additional (novel) creditworthiness insights will assist with the differentiation of more and less creditworthy entrepreneurs.
- Financial statement lending: Applicants with a lower financial sophistication level may be less creditworthy loan applicants.
- Relationship based lending: Applicants that are less willing to post collateral may be less creditworthy loan applicants.

1.5. Objectives of the study

In South Africa, research has been done on many aspects within lending. These include but are not limited to studies on the existence (or not) of a credit mismatch (for example von Blottnitz, 2009; Rankhumise and Rugimbana, 2010), forms of finance available and responses to the mismatch (for example Schoombee, 2000 and Schoombee, 2004), causes of the unfulfilled demand (for example Olawale and Van Aardt Smit, 2010) and lending approaches (for example Pretorius and Shaw, 2004). With regard to the SMME entrepreneur, many studies have been done on the status of entrepreneurial activity in South Africa (for example GEM, 2002; GEM, 2003), the various weaknesses that proliferate within the entrepreneurial population (for example GEM, 2005; GEM, 2007), the extent of business failure (for example Brink, Cant and Ligthelm, 2003; Ladzani and van Vuuren, 2002; Liedholm, 2001) and the causes of those failings (for example Ligthelm and Cant, 2003). However, there is an absence of creative research on South African specific bank lending technologies. In addition, little research has been done on the behavioural characteristics of South African entrepreneurs. Importantly, few published studies (none in South Africa) were found that bind these seemingly intertwined fields. Yet it would seem that the entrepreneurial character of the loan applicant would be of considerable interest to the loan officer. Specifically, an understanding of the cognitive biases and heuristics that form part of the entrepreneurial process has not been linked to the financial institution's creditworthiness decision.

The study seeks to explore the viability of alternative, primarily behavioural finance based sources of creditworthiness information when assessing loan applications in the nascent and new entrepreneurial SMME sector. Each of the most prominently used lending technologies will be addressed separately.

Financial Statement Lending

Entrepreneurs may understand and effectively incorporate financial information into their business decision making process despite being unable to meet the complex financial demands set by financial institutions. An analysis of the regularity with which entrepreneurs utilise financial information in the decision making process

together with their understanding of basic financial concepts is proposed as a supplement to traditional financial statement lending. In addition, insights into the willingness with which entrepreneur's provide information may further clarify the perception that non provision of financial information is a signal of credit risk.

Small Business Credit Scoring

Perry (2008) found that consumers with higher levels of financial knowledge and who also believe that their actions will produce predictable outcomes (internal locus of control) generally had higher credit scores. Slavec and Prodan (2009) found that entrepreneurs who exhibited self efficacy stood a greater chance of securing trade credit. An analysis of the extent to which entrepreneurs are influenced by cognitive biases and heuristics in the decision making process is thus proposed as a supplement to SBCS.

Relationship Based Lending

The phenomenon of discouraged borrowers is one where good businesses that require funding from banks choose not to apply because they feel that they will fall short on the collateral or other requirements and their loans will be rejected. Relevant to the South African SMME context, this was shown to occur most often where there was some, but not perfect information i.e. a level of information asymmetry (Kon, Storey, 2003). The entrepreneur must be willing to post collateral in the instance that the loan application is accepted. An analysis of the level of dread with which entrepreneur's respond to collateral demands is proposed as a supplement to traditional relationship lending and the provision of collateral.

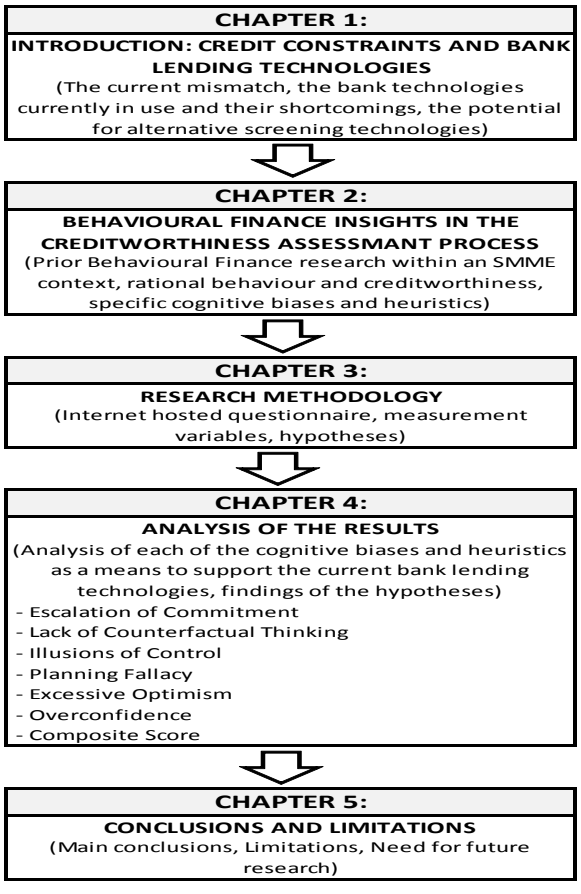
The thesis progresses as follows:

- Chapter 2 describes entrepreneurs within a Behavioural Finance context. The case for utilising Behavioural Finance insights as an additional bank technology tool is presented. The cognitive biases and heuristics most relevant to a creditworthiness assessment are analysed.

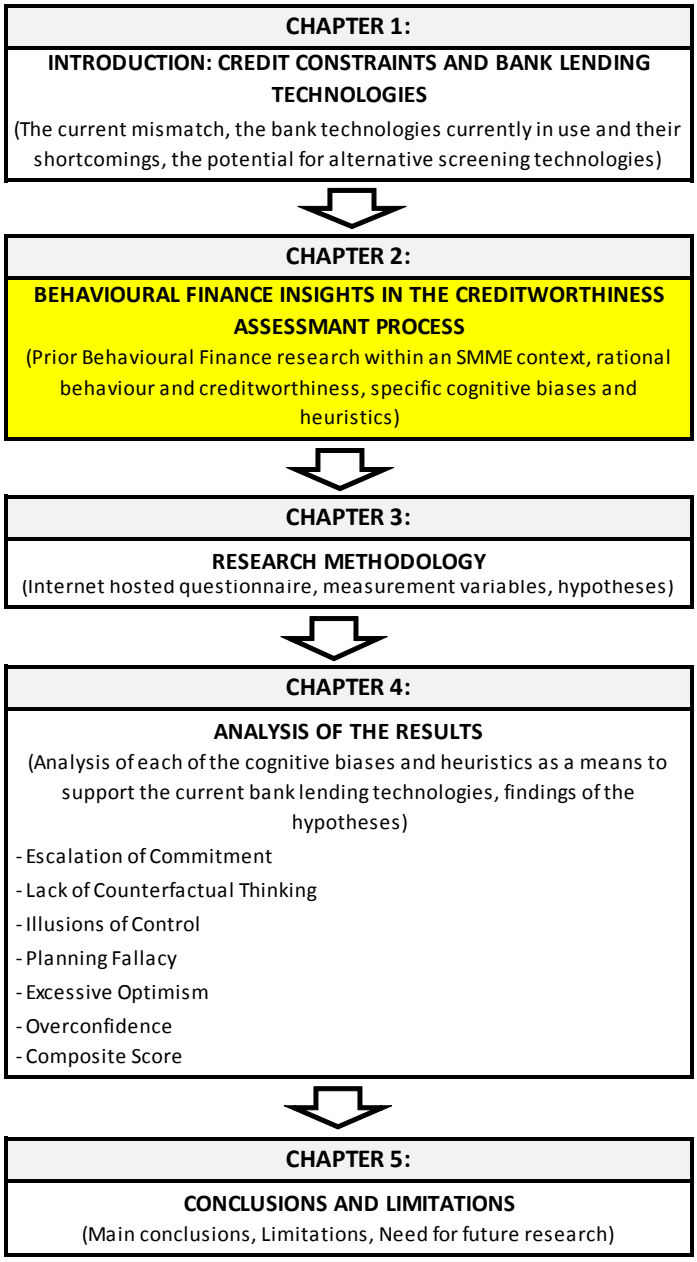
- Chapter 3 sets out the methodology with which the research project was undertaken. The usage of an internet questionnaire is described and the measurement variables defined. The hypotheses are then developed.
- Chapter 4 presents the results of the questionnaire responses. Each of the cognitive biases is analysed within the context of the three lending technologies.
- Chapter 5 presents a summary of the major findings and their potential implications for future creditworthiness assessments. The limitations are discussed and areas where future research would be valuable are identified.

The overall chapter layout is presented in Figure 1.1. This figure will be repeated at the onset of each chapter to contextualize the content as the thesis develops.

Figure 1.1 Chapter layout



Chapter 2 – Behavioural Finance insights in the creditworthiness assessment process



2.1 Introduction

Several important entrepreneur specific variables that do not yet form part of the widely utilized, formal creditworthiness assessment process are presented. Behavioural Finance insights are introduced in this context, given the significance

and influence of cognitive biases and heuristics in the SMME management process. Those cognitive biases and heuristics that are most likely to affect an entrepreneur's predisposition to risk taking are described. Previous research; specifically recent empirical studies on these cognitive biases and heuristics is presented. It is then suggested that evidence of chronic influence by one or more of these biases and heuristics would be a useful insight in the creditworthiness assessment process.

2.2 An alternative creditworthiness technology

Having identified the mismatch between the demand and supply of credit in the SMME sector and the possible inefficiencies in the screening process, other variables will be described that have not been formally considered within the creditworthiness assessment process in the past.

2.2.1 The missing creditworthiness variables

Building on previous research characterising attributes of successful entrepreneurs, Buttner and Rosen (1988) asked bank loan officers to rate each of nine dimensions in terms of their interrelatedness to successful entrepreneurship. Included in these dimensions were, amongst others, leadership skills, persuasiveness, lack of emotionalism, low need for support and moderate risk taking propensity (defined by Sitkin and Pablo (1992) as the tendency of a decision maker to either take or avoid risks). It is noteworthy that when screening for loans, none of these nine, or alternative combinations of entrepreneurial or cognitive traits and learned skills are formally evaluated[1]. Entrepreneur specific factors that may be considered include several owner specific factors such as management experience, skills and past training (Pretorius and Shaw, 2004).

South African banks have described SMME entrepreneurs as lacking in management skills (Schoombee, 2004). It seems evident that the traditional bank lending technologies are not sufficiently able to differentiate between entrepreneurs

[1] See Pretorius and Shaw, (2004) for a list of criteria in use by the 'Big Four' South African banks.

that are creditworthy (particularly the nascent kind) and entrepreneurs that aren't in a cost effective manner – hence the reliance on collateral based lending (Manove, Padilla and Pagano, 2001). Loan officers have developed models of favourable entrepreneurial candidates for credit incorporating specific skills and characteristics, and the current lending technologies are not specifically designed to reveal evidence of these merits, the presence of which can guide the lending decision.

Financial management skills

A survey of Gauteng based entrepreneurs (Ligthelm and Cant (2003)) revealed that of the endogenous (firm based) factors, marketing related issues followed by financial management issues were seen to impact most negatively on the success of businesses. The 2007 Global Entrepreneurship Monitor report found the most significant factors hampering the effective development of entrepreneurship in South Africa to be lack of business knowledge and self confidence. The inability to supply financial information is seen as an important constraint to the granting of credit from a supply side. Cole et al (2004) found that large banks will be more likely to extend credit to small firms who can demonstrate the following:

- The firm keeps formal financial records
- The firm is larger than other firms competing for the same loan
- The firm has a longer track record
- The firm has greater cash reserves
- The firm is not excessively leveraged
- The owner can demonstrate a positive credit history

Often, small firms are not able to demonstrate their financial status accurately or completely. However, SMME entrepreneurs may have deliberately chosen not to produce all of the required financial information. McMahon (1998b) cites several reasons that explain the departures from financial institution reporting requirements. These include the following:

- The SMME owner is not always a rational economic decision maker and relies on intuition and alertness to opportunities. Since the owner does not look to financial information as part of the decision making process, the mechanisms necessary to generate the information will not be in place.

- The circumstances of the business are not so demanding as to require extensive financial reporting.
- The cost of preparing the information is not insignificant whether it is prepared internally or outsourced to accountants or consultants. The owner believes that the costs of being better informed of the financial consequences of management decisions outweigh the benefits.
- The direct benefits are seen as intangible until such time as pressing economic circumstances beget a need for additional financial reporting. Information will only be prepared intermittently and usually when called for by external parties such as financial institutions or regulatory authorities.
- The owner believes that financial statements do not provide sufficiently reliable information; perhaps due to historical cost conventions. Since the owner does not trust the information, the mechanisms in place to prepare it will not be sufficient. This belief may manifest further as new Companies Act (2008) legislation removes the mandatory audit requirement for non-publicly accountable entities.
- The owner believes that financial statements do not provide management with the primary information needed for decision making purposes. The ideal requirements will often be prohibitively expensive and will, negate the need for other financial reports.

Nevertheless, the non-provision of financial information generally serves as a signal to the bank that the entrepreneur is a risky candidate. The impetus of the entrepreneur behind not supplying the required financial information is generally not considered. Where the SMME entrepreneur lacks the necessary resources or motivation to provide all of the required information or is starting up and does not have the financial history to report, the bank must look to evidence from other sources. An assessment of the candidate's commercial numeracy skills and the extent of the applicant's usage of financial information will be two of the variables explored as an alternative methodology in determining financial management skills.

Small Business Credit Scoring

The SBCS model developed in 1995 by Fair Isaac, a leading risk management company, found that the most important indicators of small business loan performance were characteristics of the business owner rather than the business itself i.e. the owner's credit history was more predictive than the profitability or net worth of the business (Mester, 1997). Thus, the applicant's SBCS should provide a signal to the bank of the entrepreneur's propensity to rational decision making. Where the SMME entrepreneur lacks the necessary credit history through which a meaningful credit score can be established, alternative creditworthiness methodologies must be found and utilized. An assessment of the entrepreneur's propensity to irrational decision making through the cognitive biases and heuristics that manifest in the management decision making process will provide evidence of the entrepreneur's predisposition to excessive risk taking.

Relationship Based Lending

Past research findings differ as to the extent of the impact of the length of the bank borrower relationship on the bank's collateral demands (Berger, Espinosa et al, 2007; Degryse and Van Cayseele, 2000). While the collateral serves as a catalyst to the positing of collateral, it confines lending to a wealthier borrower pool and does little to reduce the uncertainty behind the borrower's creditworthiness. The motivation behind the entrepreneur's decision to post collateral has been largely ignored. An assessment of the entrepreneur's willingness to post collateral together with the availability of collateral may provide evidence as to short-sightedness of the 'lazy bank' (Manove et al; 2001) phenomenon of lending solely on the basis of collateral.

It is these alternatives that will be explored. The possibility of determining propensity to irrational decision making in a creditworthiness decision through behavioural finance theory will be proposed as an enhancement to SBCS. Knowledge of commercial numeracy skills and extent of usage of financial information will be proposed as an enhancement to financial statement lending. Availability and willingness to post collateral will be posited as enhancements to relationship based lending. Since cognitive biases can evolve over time (Hasselton and Nettle, 2006), it is anticipated that the behavioural decision making processes exhibited by more established entrepreneurs will differ than those of nascent entrepreneurs. Insights

emerging from the behavioural finance and other creditworthiness analyses will therefore contrast nascent entrepreneurs from those of established entrepreneurs.

2.3. Background to Behavioural Finance research

Behavioural finance introduces the possibility that financial decision makers are less than fully rational and employ heuristics and certain systematic cognitive biases. At this point it is important to define decision making heuristics as simple and approximate rules, guiding procedures, shortcuts and strategies that are used to solve problems (Buchanan and Huczynski, 2004). They act as filtering and organizing devices which simplify and thus speed the decision process. Heuristics have also been associated with faster learning and innovative behaviour (Buchanan and Huczynski, 2004) in terms of their ability to yield insights into unresolved issues. They can also result in decision errors due to the nature of the shortcuts and biases exhibited. Cognitive biases can be defined as prejudiced predispositions or a systematic distortion when making a decision. Biases, while helping decision makers cope with their cognitive limitations, may result in less rational and less comprehensive decision making i.e. deviations from 'textbook' financial behaviour. Departures from the theories are termed anomalies yet to be resolved. Whereas normative Modern Finance Theories provide the theoretical framework for economic analyses, explicitly descriptive models of behaviour in markets and organizations are being and have been developed. Entrepreneurs are less likely to have access to historical trends and other information to analyse and then reduce the level of uncertainty behind many business decisions at a relatively low cost. Nor do they necessarily place much reliance on many of the financial reports commonly produced. They may systematically overestimate the reliability of information at their disposal, draw incorrect conclusions and give information too little or too much weight. Entrepreneurs' decisions stem from a wide range of non-business and untraditional information (Kaish, Gilad, 1991). Without their willingness and confidence to make decisions with the scattered information available, they would not be able to manage their companies. Bryant (2007) adds that simple decision heuristics enable entrepreneurs to function in dynamic and uncertain environments, evaluating and exploiting opportunities despite the pressures of limited time and

information. An investigation into this cognitive approach would thus be concerned with the entrepreneur's preferred way of gathering, processing and evaluating information.

As Behavioural Finance theory developed, researchers began to focus on entrepreneurial decisions. Given the inherent riskiness in starting a venture, researchers suggested that entrepreneurs had a lower perception of risk than others (Kahneman and Lovallo, 1993). It was then argued that this lowered perception of risk was caused by the prevalence of cognitive biases (Busenitz and Barney 1997; McCarthy, Shoorman and Cooper 1993; Palich and Bagby 1995; Shaver and Scott 1991). Baron and Ward (2004) extended these findings by stating that cognitive factors play a significant part in the entrepreneurial process. These insights have fundamentally changed the way we look at how financial decisions are made. Since it is human decisions that cause businesses to succeed or fail, much research has shifted to the decision making aspects rather than the operational / commercial aspects of business management. Recent research reveals that the cognitive approach better explains entrepreneurial behaviour and perception. Shaver and Scott (pg. 39, 1991) state:

> "Economic circumstances are important; social networks are important; entrepreneurial teams are important; marketing is important; finance is important; even public agency assistance is important. But none of these will, alone, create a new venture. For that we need a person, in whose mind all of the possibilities come together, who believes that innovation is possible, and who has the motivation to persist until the job is done."

Many studies have applied specific cognitive biases and heuristics to economic activities (several that apply specifically to SMME management are discussed in sections 2.6. and 2.7). Cognitive biases are likely to be exhibited in SMMEs than larger firms (Forbes, 1999), due to the prevalence of many factors such as information overload, high uncertainty, time pressure and considerable ambiguity (Baron, 1998).

However, few studies have identified or developed more comprehensive frameworks that allow for the modelling of decision processes, particularly around the area of failure prediction. Based on the body of behavioural finance literature, Yazdipour and

Constand (2010) posit that a relationship exists between the probability of venture failure and the intensity of the cognitive biases of the individual managing the venture. They connect the applicability of the relationship primarily to the realm of Venture Capital finance without progressing the research to the development of a model or specific approach. In fact, very little research has suggested practical methodologies to apply behavioural finance insights to failure prediction or other commercial screening processes.

While there is a general consensus as to the necessity of cognitive biases and heuristics in the entrepreneurial decision making process, these characteristics also point to irrational behaviour that may cause the entity to fail. Screening entrepreneurs within a commercial selection process must therefore acknowledge that the presence of certain cognitive biases is likely to be found amongst entrepreneurs and that the intensity of these biases may be an indicator of failure or success. Within this study, a practical application of a theoretical SMME failure prediction model will be proposed and then analysed.

2.4. Potential usefulness of behavioural finance as a credit assessment tool

An understanding of the cognitive biases and heuristics exhibited by an SMME owner may shed further light on the creditworthiness of the individual. Biases and traits that lend themselves to a lowered risk perception resulting in more frequent and excessive risk taking amongst credit applicants should be of particular interest to financial institutions. In South Africa currently, SBCS and collateral demands together with an evaluation of the business plan or financial statements are the primary forms of risk assessment employed at the SMME level (Botha, 2008; Busse, 2008). Banks and other lenders focus on the candidate's financial results and credit history and do not necessarily evaluate the propensity of an applicant to engage in irrational behaviour. SBCS circumvents screening of the project to a large degree and monitoring cost constraints preclude a detailed analysis of the applicant's business plan or financial statements. Any further insights into the viability of the firm or project are diminished by the information asymmetry created as a result of the unsophisticated financial management and information available. As a result,

applications may be short-sightedly approved or declined, due to the lack of a suitable credit history or poor business communication skills. This may happen in several instances:

- The financial institution has gained no certainty regarding the results of the SBCS
- The financial institution has gained no certainty from the information contained in the business proposal
- Collateral has been requested and the applicant is not able to meet the collateral demands or unwilling to post the collateral

Alternatively, imperfect screening may also result in the phenomenon of discouraged borrowers. Creditworthy firms may not apply for credit at all rather than face the prospect of being rejected (Kon and Storey; 2003).

Were it possible for the financial institution to understand the behavioural inclinations of the entrepreneur behind the firm applying for credit, the level of information opacity might be somewhat mitigated. Drawing on international literature in behavioural economics, Lunn (2011) hypothesized that seven established biases in judgment and decision making played a role in the Irish banking crisis (the applicability of the crisis to global economies is more broadly hypothesized). Various transacting parties were prone to the influence of cognitive biases and heuristics including lenders, borrowers, regulators and economists. Lunn suggests that were these parties sensitive to the influence of cognitive biases and heuristics within their decision making processes, the extent of the credit crisis may have been lessened. These conclusions hint at the potential benefits of behavioural finance awareness as an alternative source of information in improving the decision making process. A practical and somewhat intuitive usage of behavioural finance knowledge is to analyse the behavioural factors behinds a decision to avoid making mistakes i.e. defensive behavioural finance applications (Fromlet, 2001). Bryant (2007) states that since it is possible to identify a person's chronic self-regulatory characteristics, the information could be used by investors to evaluate nascent and practising entrepreneurs in terms of their heuristic decision making skills. Yazdipour (2010) develops several themes around the practical usage of behavioural finance. He recommends that both parties in a Venture Capital seed investment decision attempt

to understand each other's' views as a means to reduce the perception asymmetry between them. No specific model is developed, nor are explicit methodologies suggested. However, a strong suggestion for future research is recorded; specifically in developing and making a risk equation operational that processes both objective and subjective risks and uncertainties around the Venture Capitalist / Entrepreneur seed investment decision.

Shepherd (2011) highlighted the usage of multilevel models of decision making on entrepreneurial tasks as an important area for future research. In this vein Palich and Bagby (1995) state that the demonstration of specific traits by entrepreneurs may be useful to third parties interested in assessing natural persons for entrepreneurial behaviour. Similarly, If the bank were able to determine the entrepreneurs' propensity to risk taking in conjunction with the mental short-cuts that they employ when evaluating the opportunities they intend to pursue, it might be possible to offer or decline credit with a greater degree of certainty.

2.5. Testing for entrepreneurial traits and skills

When assessing a candidate for the purposes of entering into an agency agreement, many different behavioural attributes may be considered desirable. Where a lender is assessing a borrower, foremost in the determination of creditworthiness is the level of certainty that the lender will be repaid. It is imperative that the owner / manager of the business exhibits the traits, skills and behavioural characteristics considered important to be a successful entrepreneur. Significant research has been done on entrepreneurial traits and learned skills (for example, Sexton and Bowman, 1985; Sexton and Upton, 1987; Utsch and Rauch; 2000; Baum, Locke and Smith; 2001) including investigations into self confidence, innovation, energy and good communication skills. These traits or skills will influence the manner in which entrepreneurs relate to the various stakeholders and the skills they are able to harness in the marketplace. Recent creditworthiness experiments at several Southern African lending institutions that include psychometric screening tests have yielded promising results (Winter, 2010). Depending on the experience and background of the lender (Bruns, Holland, Shepherd and Wiklund, 2008), certain

traits will be favoured over others. Financial institutions will differ in the lending profiles they prefer and while all are important, certain businesses will have a greater need for specific traits and skills in their leaders than will others. It may therefore become a complex exercise to screen and match the entrepreneurial attributes to both the business and the preferences of the lender. Rather than screen for entrepreneurial traits and learned skills, it is suggested that screening for behavioural characteristics i.e. chronic cognitive biases and heuristics might more easily yield useful information.

2.6. Cognitive Biases and predisposition to risk taking

McMahon (2006) refers to over one hundred highly specific cognitive biases and heuristics as cited by Manimala in 1992. For the purposes of this study, only those biases that have been investigated in earlier research with particular reference to the decision making process of the SME entrepreneur will be discussed. In particular, those that have been shown to have an influence on ones predisposition to risk taking are currently of interest. There is no worldwide consensus on an exact definition for predisposition to risk taking. Read, Song and Smit (2009) recently described it as being cognisant of one's affordable loss i.e. calculating the downside potential and not risking more than one can afford. Entrepreneurs are likely to evaluate an idea more favourably when they perceive less risk in that idea (Keh, Foo and Lim, 2002). Alvarez and Busenitz (2001) explain the phenomenon as being the only way entrepreneurial progress can occur. In addition, entrepreneurs are attracted to riskier ventures as they do not perceive the inherent riskiness, not because they knowingly accept the higher levels of risks (Simon, Houghton and Aquino, 1999). In an environment where one in three non-white entrepreneurs (one in five white) start businesses because they perceive no other choice for themselves (GEM, 2007), the propensity to risk taking is likely to be further increased. In addition, it is extremely difficult to eliminate the impact of biases since individuals are generally unaware that they are exhibiting them (Kruger & Dunning, 1999; Barberis and Thaler, 2003).

Cognitive biases and heuristics form a fundamental underpinning to the success or failure of a venture since they ultimately influence the lengths to which entrepreneurs

go to evaluate the situations and the prejudices inherent in their decision making processes. The rational entrepreneur will analyse the options, reduce the decision uncertainty to the extent that is possible given the information available, and then decide on a course of action. The lending official is unlikely to verify that the entrepreneur's predisposition to risk taking, core to the decision making process, is not excessive.

The lender will price the loan based on the risk of loss that they perceive to be inherent in the venture. If the lender realized that the entrepreneur's predisposition to risk taking were excessive and indicated more inherent risk of loss in the project than initially determined, the loan might never have been granted or alternatively the loan price might need to be adjusted. The focus of this research study will therefore be on those cognitive biases that have been found to influence ones predisposition to risk taking.

In order to proceed, those cognitive biases and heuristics most likely to influence entrepreneurial behaviour must be highlighted.

2.7. Previous research on Behavioural Finance in Entrepreneurs

Much of the past descriptive Behavioural Finance research within the entrepreneurial realm has reasoned as to the presence of specific biases and heuristics (for example De Meza and Southey, 1996; Baron, 1998). Past empirical research has identified and explained several of these cognitive biases and heuristics in line with common entrepreneurial behaviour. Sample size neglect and overconfidence (Busenitz, 1999), excessive optimism (Palich and Bagby, 1995), illusion of control (Simon, Houghton and Aquino, 1999; Le Roux, Pretorius and Millard, 2006 (South African study)), escalation of commitment (McCarthy, Schoorman and Cooper, 1993), planning fallacy (Keh, Foo and Lim, 2002), sunk cost fallacy (Shepherd and Zacharakis, 2000) and endowment effect (Shepherd and Zacharakis, 2000) are among the cognitive biases that have been empirically found to exist in owners and managers of SME firms. Among the common decision making heuristics prevalent in SMME business owners, framing (Palich and Bagby, 1995; Kuusela, Spence and

Kanto, 1998), representativeness (Busenitz, 1999), and counterfactual thinking (Baron, 1999) have been proposed.

Of interest to this research is the manifestation of cognitive biases and heuristics that affect the South African SME entrepreneur's propensity to risk taking and irrational decision making. Of particular relevance, therefore, are the cognitive biases and heuristics that have been correlated, either directly or indirectly, with lack of aversion to risk taking and those that may result in irrational decisions in a small business environment. Illusion of control (Keh et al, 2002; Simon et al 1999), lack of counterfactual thinking (Baron, 1999) and framing (Kuusela et al, 1998) have been correlated with a reduced risk perception or higher propensity to risk taking. Keh et al (2002) did not eliminate the possibility of correlating risk perception to planning fallacy, though they did not find a significant correlation (likely due to the vagueness of the questionnaires employed). Past empirical research has not tested whether there is a correlation between escalation of commitment and risk perception. McCarthy et al (1993) found that overconfident individuals tend to exhibit the escalation of commitment bias and that negative feedback seems to evoke self justification. A correlation between the borrower's excessive optimism bias and a lessened perception of risk has been proposed but not yet empirically proven (De Meza and Southey, 1996). Entrepreneurs have been found to exhibit overconfidence though the overconfidence bias alone cannot be said to heighten risk taking behaviour. Overconfidence may cause an entrepreneur to irrationally entrench himself in a risk averse or high risk decision.

2.8. Description of the relevant biases and heuristics

Based on the prior research presented in 2.6, it seems that the Excessive Optimism, Illusions of Control, Planning Fallacy, Overconfidence and Escalation of Commitment biases as well as the Lack of Counterfactual Thinking heuristic seem likely to have the greatest influence on an entrepreneur's propensity to risk taking. They are therefore likely to be the most relevant to the creditworthiness assessment process and will thus form the focus of this research. Each of these biases and heuristics are described further.

2.8.1. Excessive Optimism

This bias is exhibited when an individual systematically overestimates the probability of a favourable outcome or systematically underestimates the probability of an unfavourable outcome. The bias may cause one's perception of risk to be lower and thus obviate the need for taking precautions. De Meza and Southey (1996) concluded that entrepreneurs are generally excessively optimistic people. They further note that given the extremely high rate of small business failures, it is difficult to believe that entrepreneurs have appreciated all of the pitfalls. Cooper, Woo and Dunkelberg (1988) found that entrepreneurs rated their chances of success as significantly higher than those of similar businesses. Arabsheibani et al (2000) further explained that excessive optimism is less evident with more experienced, better educated entrepreneurs. However, Palich and Bagby, (1995) concluded that entrepreneurs are more likely to frame decisions positively when faced with ambiguous information. Using a scenario approach involving 148 entrepreneurs, they found that entrepreneurs viewed some situations as opportunities where others saw little potential. They did not perceive themselves to have a greater propensity to risk taking than non-entrepreneurs, while perceiving less risk in certain of the scenarios than the non-entrepreneurs.

2.8.2. Escalation of Commitment

This bias is exhibited when an individual who has made an initial decision, recommits to that decision despite negative feedback that indicates the initial decision may have been incorrect. The individual then makes further decisions biased by the initial commitment, being reluctant to forego the value or effort already committed. In a study investigating escalation of commitment in new product developments, Schmidt and Calantone (2002) found that giving managers better information did not lead to better decision making. Hambrick et al (1993) noted that the manifestation of the Escalation of Commitment bias increases when decision makers have worked within the company or industry for a lengthy duration. McCarthy et al (1993), in a research investigation involving 1,112 companies, found that entrepreneurs who had started their own firms were significantly more likely to make

the decision to expand and that these tendencies to Escalation of Commitment were more likely when market feedback was negative. Shepherd and Zacharakis (2000), in a study involving 59 future family businesses leaders, found that entrepreneurs exhibiting a greater endowment effect were more likely to invest in projects with a greater risk of financial loss.

2.8.3. Lack of Counterfactual Thinking

The Counterfactual Thinking heuristic is exhibited where the entrepreneur tends to dwell on past events, imagining how circumstances would be different today if different courses of action had been taken. Engaging in counterfactual thinking can have positive benefits. The process of imagining alternative outcomes can lead to useful insights into the factors that lead to the actual outcomes. This in turn can lead to better decision making in the future. Lack of counterfactual thinking precludes this learning experience. Research (e.g. Roese, 1997) points to the understanding that engaging in counterfactual thinking has a net positive benefit especially in situations that are to some extent controllable and likely to repeat in the future. Cassar and Craig (2009) find the presence of hindsight bias (the inability to accurately recall past experiences) in all but the most formally educated nascent entrepreneurs. In a study of counterfactual thinking and the negotiation process it was found that the presence of upward counterfactual thinking (comparing the current reality to a more ideal situation) appears to motivate individuals to avoid the possibility of future regret by taking protective measures to prevent its reoccurrence and that counterfactual thinking increases the amount of preparative time spent (Galinsky, Seiden, Kim and Medvec; 2002). In an empirical test involving 44 entrepreneurs, 26 aspiring entrepreneurs and 32 non-entrepreneurs, Baron (1999) found that the entrepreneurs were significantly less likely than the other groups to engage in counterfactual thinking. Baron concluded that where engaging in counterfactual thinking may cause individuals to perceive situations in less favourable (e.g. riskier) terms, its lack may cause entrepreneurs to take riskier decisions.

2.8.4. Overconfidence

The Overconfidence bias is exhibited where individuals overestimate and then stand by the correctness of their estimates when answering difficult questions or dealing with unclear decisions. They may not be aware of the limits of their knowledge and may therefore treat their assumptions as facts with no possibility of error. Busenitz and Barney (1997) found that entrepreneurs are more overconfident during their decision making processes than are managers of businesses. They explain that decisions might never be made were this not the case given the information constraints at a smaller business level. Zacharakis and Shepherd (2001) found amongst venture capitalists that overconfidence negatively affected decision accuracy. The level of overconfidence depended upon the amount and type of information. The more information received, the more these individuals tended to believe that they were making a 'more informed decision'. The outcome of their findings is that the greater their confidence (influenced by the amount and type of information they had), the less accurate were the venture capitalists decisions. In a study involving 191 MBA students, Simon et al (1999) found that overconfidence did not lower (or increase) risk perception. Individuals may have a great belief in the accuracy of their assumptions, but those assumptions may not always lead to optimistic conclusions. That is, an entrepreneur may be convinced of the accuracy of their belief that an opportunity will fail.

2.8.5. Illusions of Control

The illusion of control bias is exhibited in cases where an individual overemphasises the extent to which their skill can increase the outcome in situations where chance or uncontrollable external variables are the deciding factors. In a series of gambling experiments, Koehler, Gibbs and Hogarth (1994) found that illusion of control was more commonly exhibited in single shot (once off) gambles, but less so in multi shot gambles. This implies that once people become more familiar with the underlying randomness of the outcomes, they become less deluded as to the impact their skills have on the outcome. Simon et al (1999) utilising a teaching case and 191 MBA students, found that individuals who laboured under an illusion of control bias had a lower perception of a venture's riskiness, suggesting that these individuals when

starting ventures might not acknowledge that certain variables, crucial to the venture's success, are beyond their control. Le Roux et al (2006) found a negative correlation between the Illusion of Control bias and risk perception, utilising a questionnaire approach and a subjects from a South African university i.e. individuals with a chronic Illusion of Control bias were more likely to have a lower perception of risk. Keh et al (2002), unlike the Simon et al (1999) study, revealed that small business owners do not believe that they can control market conditions, though they may believe they can influence future outcomes and take the necessary actions to hedge their risky positions. The study advised that engaging in counterfactual thinking, analysing the information available or asking for advice might avoid reliance on one's instincts alone and thus reduce the illusion of control bias.

2.8.6. Planning Fallacy

The Planning Fallacy bias is exhibited where individuals overestimate the amount that they can accomplish given a fixed amount of time or resources. Baron (1998) states that entrepreneurs anchor their forecasts not on lessons from past similar experiences (see counterfactual thinking), but rather on a glowing image of the future, given that they have little relevant experience to draw upon. Kaish and Gilad (1991) note that smaller entrepreneurs need to use their own intuition to gauge the potential of the market or changes in the price of supplies given that they will not have economically sophisticated information gathering tools available to larger companies. It was found that the promise of financial incentive led to increased evidence of the Planning Fallacy bias (Buehler, Griffin and MacDonald; 1997). This finding suggests that applicants requesting a loan will exhibit the bias. Keh et al (2002) did not find support for the assertion that entrepreneurs who exhibit the bias will have a lower perception of risk. However, they attribute this to the possibility that the design of the methodology was overly vague.

2.8.7. Biases in South African SMME entrepreneurs

Several factors have been found to contribute to the emergence of cognitive biases and heuristics. Many of these factors are prevalent in the SMME environment, particularly at the nascent entrepreneurial level.

Inexperience has been shown to lead to Illusions of Control, Planning Fallacy and Lack of Counterfactual Thinking. Lack of education and financial illiteracy lead to Excessive Optimism and Overconfidence, while ambiguous or insufficient information lead to Excessive Optimism, Illusions of Control and Planning Fallacy. The Escalation of Commitment bias was often found in entrepreneurs managing young businesses.

2.9. The impact of chronic cognitive bias traits on the creditworthiness decision

It can reasonably be expected that the majority of entrepreneurs will exhibit elements of cognitive biases and heuristics in their decision making process. Based on the cited research, it is anticipated that many South African SMME entrepreneurs (particularly nascent entrepreneurs) will exhibit one or a combination of the Excessive Optimism, Escalation of Commitment, Lack of Counterfactual Thinking, Overconfidence, Illusion of Control or Planning Fallacy biases.

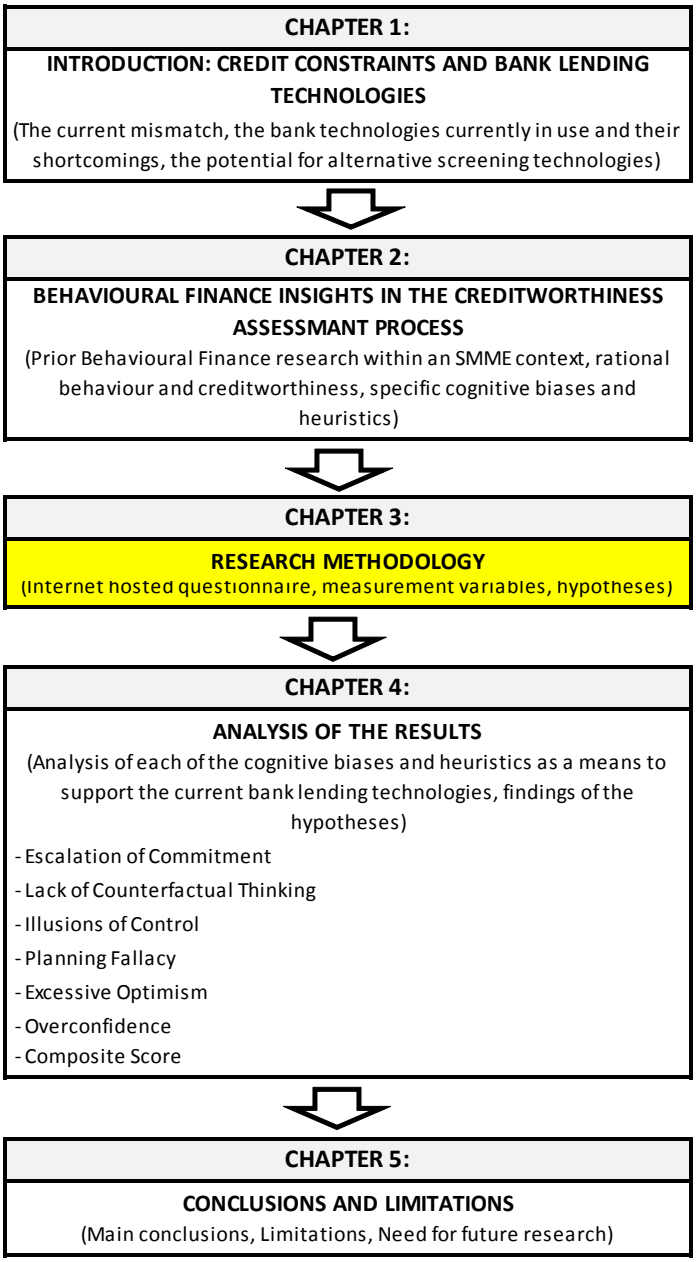
Research into behavioural finance and the entrepreneur tells us that the very decision to become an entrepreneur is a risky one. Were nascent entrepreneurs to fully appreciate the risks involved (most new ventures fail (Ladzani and van Vuuren, 2002)) and approach the decision rationally, they might not take the chance. Risk taking is a necessary ingredient for both successful and unsuccessful entrepreneurs. Given this necessity, the search for an entrepreneur who exhibited no signs of irrational decision making would reveal good and bad prospects. Excessively irrational decision making may increase the chances of failing as an entrepreneur, just as complete aversion to risk taking would necessarily prevent an individual from becoming an entrepreneur. In a country with high unemployment rates, where many nascent entrepreneurs start businesses where few other opportunities are available, financial institutions need to screen for those individuals with reasonable predispositions to risk taking. There is also the possibility that risk averse individuals with no other possibilities for a livelihood and unimpressive business opportunities

will apply for a loan. Screening for chronic cognitive biases can therefore never be the sole business lending technology.

It should be noted that it is not the intention of this study to corroborate or prove prior relationships between entrepreneurs and the presence of specific cognitive biases. This research rather leverages off these findings. It is proposed that a combination of financial information, SBCS, prior historical exposure and insights into the entrepreneurial and management nature ought to be considered when making a lending decision involving an SMME business.

It is the aim of this study to investigate whether the relationships that emerge during the application of a *rational decision making* screening methodology utilising insights, primarily from behavioural finance theory will add a dimension to the lending decision that may facilitate a more enlightened assessment. The study will examine each of the major lending technologies within this context. Relevant biases and heuristics within a sample of South African SMME owners will be compared to externally sourced creditworthiness information. Evidence as to the usefulness of Behavioural Finance insights within the creditworthiness assessment process will be derived. These insights will be discussed within the context of each of the prevailing bank lending technologies.

Chapter 3 – Research methodology



3.1 Chapter introduction

The questionnaire based research methodology is introduced. The operalization of each of the Cognitive Biases and Heuristics is presented. Responses to the questionnaire are summarized and briefly presented as well as the limitations to the research methodology. The research variables and method of calculation are described. Finally, the research framework and the hypotheses are detailed.

3.2. Methodology introduction

A mismatch between the demand and supply of SMME credit has been identified in the literature review. The difficulties that financial institutions face in identifying creditworthy candidates using the existing lending technologies was presented and the potential usefulness of alternative sources of creditworthiness information (primarily behavioural finance based) was proposed. The literature review and development of the hypothesis suggest that the manifestation of chronic cognitive biases and heuristics may provide pragmatically useful insights within the context of the creditworthiness assessment. The objective of this study is to gather and then empirically analyse behavioural based information from a sample of SMME entrepreneurs using vignettes within a questionnaires.

Data was generated and analysed to investigate the viability of assessing non traditional sources of information as part of the creditworthiness decision. Nascent entrepreneurs who have recently (<1 year) started their businesses and have not yet generated a profit history were contrasted against more experienced entrepreneurs who have traded for over a year and generated a profit history. Existing creditworthiness information on more established entrepreneurs such as informative SBCS credit ratings are generally more readily available and accessible than information on nascent entrepreneurs.

To achieve this aim, a questionnaire assessment was presented to fifty loan applicants on an internet platform. Several studies have based their conclusion on relatively small sample sizes e.g. De Maeseneire and Claeys' (2011) study on SME finance constraints in SME's Foreign Direct Investment projects (32 valid respondents), Hoelzl and Rustichini's (2005) study on overconfidence (117 valid respondents), Sadler-Smith, Hampson, Chaston and Badger's (2003) study on managerial behaviour and small business performance (156 valid responses) and Hmieleski and Ensley's (2007) research on new venture performance (168 managers' responses from 66 firms), A prior study by Keh, Foo and Lim (2002) encompassing decision making tasks used data from a sample of 77 completed surveys. While larger sample sizes have the advantage of offering more robust

evidence in a statistically focused study, the data required for this research study was restricted and the sample size, while adequate, was limited. A minimum sample size of thirty is commonly accepted as approaching representation of the population in terms of the Central Limit Theorem. Nonparametric tests generally require no more than 15% additional subjects (Lehmann, 2006). The sample size of fifty used in this research undertaking is thus seen as acceptable.

Consistent with past research on decision making processes and perceptions of risk (e.g. Simon et al, 1999; Zacharakis et al, 2001; Keh et al, 2002; le Roux et al, 2006), a case study approach is utilized to examine the respondent as a rational decision maker. A case study approach is also used to assess the respondent's basic financial acumen. Hughes (1998) comments that the case study (vignette) is valuable as a research tool as theoretical explanations of risk behaviour develop and improve. Baron and Ward (2004) advocate the use of decision making or choice tasks as a vehicle for researching entrepreneurial reasoning. In a business evaluation context, case studies are useful in that they are able to frame the complex background required for the specific behaviour being examined. All respondents are exposed to the same information set. As advised by Keh et al (2002) case studies were kept short to avoid questionnaire fatigue and thus hurried, uniform answers. The background information to the vignette was generally no longer than a short paragraph.

The questionnaire tested for evidence of the cognitive biases and the heuristics that were previously found to be linked to entrepreneurial predisposition to risk taking as discussed in section Chapter 2.8.

3.2.1. Escalation of Commitment

To capture evidence of the Escalation of Commitment bias, respondents were asked to evaluate a short vignette incorporating several relatively typical business decisions (Appendix A – Case Study 2). Each of the questions placed the respondent within circumstances where they were forced to either recommit to a prior decision despite feedback that suggested that the risk of a negative outcome was more likely than at the initial stage or to change their initial decision. Furthermore, a Likert scale was

utilized to determine the degree to which the respondent was influenced by the Escalation of Confidence bias. In certain questions where almost all of the respondents selected a similar course of action, the data was not used in the analysis on the basis that these questions were not effective in revealing evidence of a more or less than normal influence of the bias. Questions that elicited a more even spread of responses were used in the calculation of an Escalation of Commitment score as defined in 3.7.

3.2.2. Lack of Counterfactual Thinking

In capturing evidence of the Lack of Counterfactual Thinking bias, respondents were asked to evaluate a short vignette incorporating several relatively typical business decisions (Appendix A – Case Study 1). Each question elicited a response from the applicant based on their proclivity to recalling past events that lead to the current circumstances described in the vignette. The course of action selected by the respondents indicated the influence that counterfactual thinking exerted on their decision making processes. When analysing a particular question, those respondents who chose to dismiss information from past failures in similar circumstances as irrelevant typically exhibited Lack of Counterfactual Thinking. The results presented in 4.6 demonstrate that the vignette and questions were not successful in revealing the presence or absence of the Lack of Counterfactual Thinking bias.

3.2.3. Illusions of Control

To capture evidence of the Illusions of Control bias, respondents were asked to evaluate a short vignette incorporating several relatively typical business decisions (Appendix A – Case Study 4). Each of the questions placed the respondent within a situation where factors outside of their control were influencing their business operations. The respondent was then forced to commit to a course of action that would reveal the extent to which they felt they could influence or predict the ultimate manifestation of these external factors. Furthermore, a Likert scale was utilized to determine the degree to which the respondent was influenced by the Illusions of Control bias. In certain questions where almost all respondents chose a similar

course of action, the question responses were not used in the analysis on the basis that these questions were not effective in revealing evidence of a more or less than normal influence of the bias. Questions that elicited a more even spread of responses were used in the calculation of an Illusions of Control score as defined in section 3.7.

3.2.4. Planning Fallacy

In capturing evidence of the Planning Fallacy bias, respondents were asked to evaluate a short vignette incorporating several relatively typical business decisions (Appendix A – Case Study 5). Loan applicants were asked to commit to a course of action given a set of circumstances that highlighted either limited availability of time or other resources. Respondents who made a decision where there was a strong likelihood that they would have insufficient resources or time to complete the task were judged to be more influenced by the Planning Fallacy bias. Furthermore, a Likert scale was utilized to determine the degree to which the respondent was influenced by the Planning Fallacy bias. Questions that were answered similarly by a vast majority of the respondents were disregarded in terms of further analysis. Questions that elicited a more even spread of responses were used in the calculation of a Planning Fallacy score as defined in 3.7.

3.2.5. Excessive Optimism

To capture evidence of the Excessive Optimism bias, respondents were asked to evaluate a short vignette incorporating several relatively typical business decisions (Appendix A – Case Study 3). Respondents answered a series of questions that included opportunities to further their business operations. The opportunities with higher payoffs had a greater chance of failure. Respondents were required to commit to a course of action that would prepare their operation for either the more optimistic but less likely opportunity or the more likely alternative. Respondents that consistently prepared for the more optimistic alternative were judged to be more influenced by the Excessive Optimism bias. Questions that were answered similarly by a vast majority of the respondents were disregarded in terms of further analysis.

Questions that elicited a more even spread of responses were used in the calculation of an Excessive Optimism score as defined in 3.7.

3.2.6. Overconfidence

In order to capture evidence of the Overconfidence bias, respondents were required to answer a series of general knowledge questions. After each question, they were asked to rate their level of confidence on a scale from Zero to Five, that the answer that they gave was correct. Respondents that consistently assumed that their answers to the questions were correct despite them being false were judged to be labouring under the Overconfidence bias. The level of confidence attached to all questions that were answered incorrectly were summed and an Overconfidence score was calculated as defined in 3.7.

In addition, the questionnaire tested for evidence of commercial numeracy skills, the extent of usage of financial information and the applicant's willingness to offer collateral. The data was analysed against existing credit information available to the lending institution. Relationships between the various constructs were investigated and insights developed that might be useful to the lending institutions in reducing the uncertainty left unresolved by the existing lending technologies. In this manner, the incorporation of behavioural finance insights as a creditworthiness assessment tool was examined as a potentially useful instrument.

3.3. Questionnaire Completion

Several financial services companies specifically target the SMME credit market. Blue Financial Services, a company listed on the Johannesburg Stock Exchange recently established a division to allocate loans to SMMEs. Blue's large distribution network would facilitate the nationwide collection of responses thus reducing the possibility of a geographic bias. Their loan applicants therefore satisfied many of the requirements necessary for this research. The questionnaire was offered in English, Afrikaans, Zulu and Sotho to ensure that entrepreneurs were, to a great extent, not

excluded based on their language preference. The language selection would also assist in facilitating more accurate responses.

Over the period February 2009 to October 2009, fifty loan applicants completed the questionnaire. An examination of the demographics of the loan applicants presented in Figure 3.1 revealed that 70% were male and 70% were over 30 years old. 50% of the businesses were start-ups. The industries that they were trading in were fairly diverse, with the largest proportion (42%) engaged in services. The applicants' businesses were spread throughout South Africa (one applicant was based outside of South Africa's borders) with most applicants located in the greater Johannesburg area. This is fairly representative of the South African economy.

The size of the loan was recorded but not validated. This was treated as a neutral variable – of primary interest was only that the entrepreneur was seeking finance. Since the loan size was not key to the research undertaking and was unlikely to affect the findings, no further investigation into the size of the loan as a variable in both the entrepreneurial decision making process and the creditworthiness process was performed.

SUMMARY STATISTICS OF ENTREPRENEURS

SECTOR (N=50)		
Manufacturing	3	6%
Services	21	42%
Retail	5	10%
Distribution	7	14%
Farming	2	4%
Hospitality	6	12%
Property	3	6%
Investments	1	2%
Construction	2	4%
		100%
PROFITABLE (N=50)		
Yes	20	40%
No	5	10%
No profit history	25	50%
		100%
GENDER (N=50)		
Male	35	70%
Female	15	30%
		100%
AGE (N=50)		
Less than 20 years old	1	2%
20 to 30 years old	14	28%
30 to 40 years old	17	34%
Over 40 years old	18	36%
		100%
LOCATION (N=50)		
Gauteng	31	62%
Western Cape	5	10%
Eastern Cape	5	10%
Kwazulu Natal	3	6%
Free State	2	4%
Other	4	8%
		100%

Figure 3.1 Applicant demographic summary

Each respondent's identity was entered on the database of the Experian credit rating agency and a Delphi score requested. Experian, South Africa's foremost consumer credit bureau, offers its subscribers a credit report and a Delphi credit score on all consumers who have purchased on credit in South Africa. The score is generated based on several factors including but not limited to whether an individual pays accounts on time and how much credit they have applied for in the past. While not shedding light on the current loan that the applicant is applying for, the Delphi credit score is expected to give an indication of likelihood of the entrepreneur defaulting on a future loan. Of the fifty completed questionnaires, Experian had calculated a Delphi

score for 44 of the loan applicants. One of the remaining six applicants was a resident of Botswana with a Botswana identity number that was not recognised in the Experian database. The other five had an insufficient demographic or credit history for even a rudimentary score to be calculated. These applicants therefore yielded scores of zero (the most common scores are between 500 and 700). All of the questions in the questionnaire were completed by all respondents. The respondents were not able to submit the questionnaire without having completed it in full as the loan officers at Blue requested that it be completed as part of the official application process.

3.4. Limitations to the internet questionnaire and the vignette approach

The questionnaire was delivered entirely on the internet. While greatly enhancing the research possibilities, there are certain pitfalls. In addition, given the internet based research methodology, respondents would need to have access to an online computer. This requirement would likely preclude the smallest most remote entrepreneurs from participating. Couper (2000) presents a host of benefits and drawbacks to the design of an internet administered questionnaire. Contrary to the traditional administered interview, no interviewer is available to explain unclear terms or to motivate respondents to complete the questions accurately. Compounding this, the manner of presentation of a question, including the choice of 'radio buttons' or other answer tools, the order of the pre-selected answers and the graphical presentation features, can have a profound effect on the eventual distribution of answers. In somewhat addressing the potential pitfalls, the fieldwork questionnaire was delivered using the 'limesurvey.org' survey platform to allow for standard, unsuggestive questionnaire templates. Limesurvey is used in many university research projects worldwide. The fact that respondents were completing the questionnaire as part of a loan application process lends a level of assurance that all questionnaires were attempted thoughtfully.

Choi and Pak (2005) identified 48 types of biases that are found in questionnaires and categorised them into three sources: the question design, the questionnaire design and the questionnaire administration. The research questionnaire was

assembled with avoidance of these biases in mind (see Appendix B for a list). While the scope of the research project and the resources available precluded a rigorous analysis of whether all of these biases were avoided, cognisance was taken of the manner in which the questions were phrased, the presentation of the answer selection and the overall questionnaire delivery. The questionnaire was refined following an interview process with ten initial questionnaire respondents whose responses were not included in the data analysis.

It was anticipated that certain questions would not sufficiently reveal evidence of cognitive biases and heuristics as was the case with Keh et al (2002). Six questions were posed for each bias under scrutiny to increase the probability of sufficiently revealing the required evidence.

3.5. Limitations to the general methodology

Limitations to the methodology are described in terms of the inherent difficulty in determining whether the applicant is an irrational decision maker as well as the level of financial management acumen that the applicant possesses. The limitations to the questionnaire tool are then presented.

3.5.1 Assessing the applicants as a rational decision maker

An effective methodology to assess the predisposition to rational decision making of an applicant for a loan and then to determine whether that information would be useful to the loan funder would be to assess the applicant before and during the duration of the loan repayment period and then to assess the payment history after the completion of the loan duration.

- The assessment of the applicant's tendency to rational decision making would be through a detailed evaluation via interview and business simulation examples and would form part of the official application process. The periodic involvement of the funder with the applicant in the high level decisions of the

business prior to and during the duration of the loan would serve to sharpen the initial assessment.

- The ultimate assessment of creditworthiness would be an ex post facto analysis of the applicant's payment history after the completion of the loan.

No psychometric and lengthy behavioural analysis was conducted on the loan applicants during the application process nor was there screening of the applicant in the workplace as this would not have fit with an implicit goal of the study. Behavioural finance insights on loan applicants will be more useful to funders if they can be generated in a prompt and cost effective manner. If the insights can only be generated following a lengthy investigation, it is likely that they may not complement current commercial lending models that require timely decisions. For the purposes of the study, more would be learned by matching the data collection instrument with a technology more suitable for commercial deployment.

In addition, the Blue Financial Services lending methodology did not cater for a more detailed psychometric or behavioural analysis of loan applicants. The lending environment is competitive and requires that the creditworthiness screening process be effective and efficient. The management of the SMME lending division were inclined to limit the time required to complete the questionnaire to approximately 45 minutes.

Nevertheless, the research methodology was able to capture a loan applicant's predisposition to rational decision making and likelihood of paying back a loan. It is important to note that the methodology preserved certain important variables necessary to forming a comprehensive understanding of the topic:

- Assessments of the tendency to rational decision making were conducted on applicants for loans as opposed to students or other commonly used research subjects.
- A questionnaire based vignette approach simulating common business transactions was utilised. This places the respondent's frame of reference within a commercial setting and renders responses suitable to an evaluation of rational decision making from an entrepreneurial perspective. It is thus a

particularly effective research tool if prepared carefully (Ellram, 1996). It is considerably more difficult to ascertain whether the respondent's declared preferences in each of the questions would correspond with their revealed preference without periodic involvement with the entrepreneur during actual business transactions. This was not possible as none of the applicants were available for further research exercises.

In determining the actual payment performance on the loan, since no ex post facto study was possible due to the extremely high rate of failed loan applications (see Chapter 3.5), an alternative understanding of the applicant's payment history was sought. In addition, evidence of past loan repayments was revealed from the Experian credit bureau.

3.5.2 Assessing the financial management competencies

The financial literacy and utilisation of financial information by the respondents is also of interest in this study. To gain an accurate assessment of these financial aspects, one would both need to test the applicant's abilities and ascertain which sources of information are used and to what degree. Ideally, one would monitor the management of the business and certain transactions over a period to gauge the business acumen through a series of reports and negotiations. However, as stated, an implicit goal underpinning the research undertaking is to assess the loan applicants within the boundaries of a commercially plausible loan technology. Management at Blue Financial Services stressed the importance of containing the questionnaire completion time to 45 minutes. Longer screening processes result in delayed decision making and the possibility of frustrating potential borrowers – a significant drawback in an environment with seemingly limited viable funding prospects. A shorter evaluation was therefore required.

Business acumen was evaluated through a practical short vignette that required the applicants to reveal their knowledge of basic financial concepts such as profits and product costing. Usage of financial information was assessed via a questionnaire approach which specifically questioned the sources of information utilised and the degree to which they are used. The questionnaire included a list of twenty common

financial management tools and reports mentioned in past SMME research studies (Collis and Jarvis, 2002; Peel and Bridge, 1998; McMahon, 1998b). The questionnaire also assessed whether the applicants had collateral available and how willing they were to post collateral as security for a loan.

Analyses were conducted for the overall sample of fifty entrepreneurs. In addition observations were explored based on the levels of entrepreneurial experience as a company owner. Entrepreneurs with less than one year's experience who admitted to not having a profit history were classified as nascent. Those with over one year's experience were classified as established.

3.5.3 Limitations of the questionnaire evidence

As no third party developed questionnaire is commercially available for the purposes of testing for all of the cognitive biases under investigation, one needed to be developed as part of the research undertaking. It must be highlighted that the purpose of the study is not to develop a psychometric instrument that has been statistically validated to accurately test for cognitive biases. The primary goal of this research undertaking is to investigate whether alternative forms of creditworthiness information have potential to contribute to the understanding and management of the SMME lending mismatch. Specifically, the findings are intended to suggest and then examine whether further investigation and development in alternative, commercially viable creditworthiness assessment technologies are warranted, not to rigorously identify the presence of specific cognitive biases within the area of South African entrepreneurial lending. The constraints were therefore such that the questionnaire had to be convenient, concise and user friendly such that no further resources were needed when gathering the loan applicant's responses. The goals of the study and the data available required that the sample size be limited to fifty loan applicants. No meaningful factoral analysis of the questions within each of the constructs was possible given the small sample size, nor was a factoral analysis critical to the development of the findings. While several statistical tests were performed, the findings and the analysis are intended to be primarily descriptive.

3.6. Ex post facto analysis

General consensus suggests that there are several factors that prevent an optimally efficient flow of credit from suppliers to lenders. Lending institutions suggest that SMME owners lack financial and managerial skills and often present questionable business ideas. Affected SMME parties allege that credit is unfairly allocated, overly costly and practically unattainable. Evidence indicative of both stances was revealed in a brief ex post facto analysis of the outcome of each of the questionnaire respondent's loan applications. Of applicants where a Delphi score was available, Table 3.1 reveals that 45% of the respondents never completed their loan applications, while 50% of the applications were rejected. None of the applicants successfully received a loan.

Table 3.1 Outcome of loan applications

	Incomplete application	Rejection	Withdrawal
Number	20	22	2
Percentage	45%	50%	5%

Incomplete applications

Entrepreneurs may not have been able to complete their loan applications for several reasons:

- A loan was received from another lending institution (however, it is more likely that these applicants would have formally withdrawn from the process than abandoned their incomplete applications).
- Assuming they would be denied or asked for collateral they gave up midway.
- The application process was too complex and demanding.

Rejections

The lending institution rejected half of the applications as they were not able to satisfy themselves that the entrepreneur would be able to repay the loan in line with the loan agreement. This may have been due to lack of certainty around the financial and managerial skills of the entrepreneur or the prospects of the business concept.

The credit mismatch was therefore evident in the sample forming part of this research undertaking. The importance in researching methodologies that reduce the prevailing credit constraints through reducing the uncertainties that affect current lending technologies became more evident.

3.7. The measurement variables

The three major factors identified as part of the current industry creditworthiness assessment are the SBCS (e.g. Experian), collateral to be posted and the financial information provided (business plans from nascent entrepreneurs and management accounts from existing businesses). The alternative variables being investigated are those of the entrepreneur's propensity to make decisions that demonstrate evidence of the specific cognitive biases that are being investigated. In order to test the hypotheses detailed below, a numerical value is derived for each of these factors:

Small Business Credit Scoring (SBCS): The Experian Delphi score is utilised. The higher the score, the more creditworthy the applicant is deemed to be. Scores will generally range between 500 and 700 though lower and higher scores are possible.

Collateral: The applicant's willingness to post collateral as security is derived utilising a five-point Likert scale. A higher score indicates more willingness to post collateral.

Financial information: A financial sophistication measurement is derived comprising two elements. The *frequency* with which applicants utilise financial information is determined by having the applicants indicate on a five-point Likert scale the extent to which they utilize each of twenty tools and reports identified in past SMME financial management research studies (Collis and Jarvis, 2002; Peel and Bridge, 1998; McMahon, 1998b). The formula presented below accumulates the applicant's answers to the twenty questions giving a maximum score of 100. An equation then converts the score to between an integer between -1 and 1.

$$\{[((((ExtentOfUse_1 + ExtentOfUse_2 + \ldots + ExtentOfUse_{20})-20)*2) / 80) - 1] \times -1\}.$$

The second element tests the applicant's commercial acumen. Insight into *commercial numeracy skills* is measured by a simple vignette included in the questionnaire which requires the respondent to determine the selling price of a product based on the information provided. Five questions were presented and the number of correct responses were accumulated to derive a score of between one and five. Concerning both derived factors, a higher score indicates greater financial ability.

Propensity to rational decision making:
Two measures are derived that give an indication as to the presence of cognitive biases i.e. the Cognitive Risk Propensity (CRP) and the Overconfidence factor.

CRP: Four cognitive biases (Illusions of Control, Planning Fallacy, Excessive Optimism and Escalation of Commitment) and one decision heuristic (Lack of Counterfactual Thinking) are measured through the applicant's responses to separate case studies. Each case study comprises six questions testing for evidence of the individual cognitive bias or heuristic via a five-point Likert scale. Responses to each question were plotted on a histogram and the questions that elicited the most even distribution of answers within each cognitive bias construct were analysed further. A mathematically derived score between –1 and 1 was then determined for each bias and heuristic utilising the formula listed below. The number of questions utilized in each of the cognitive biases is represented as *n* in the equation.

$$\{[(((CognitiveBias_1 + CognitiveBias_2 + ... + CognitiveBias_n)-n)*2) / 5n-5) - 1] \times -1\}.$$

An overall CRP score comprising responses to the questions with the most evenly spread distributions was also generated, utilizing the same

mathematical equation. The higher the score, the more inclined to rational decision making the applicant was found to be.

Overconfidence: Since overconfidence does not on its own indicate the predisposition to risk taking (Simon et al, 1999; Keh et al, 2002) but can exacerbate the manifestation of other biases, a measure is determined. The respondent is asked a series of six general knowledge questions as well as the level of their confidence (six-point Likert scale including a zero if the applicant has no confidence in the answer at all) that the answers were correct. A mathematically derived score is determined by adding the confidence levels of incorrectly answered questions (represented as *n*) utilizing the following formula:

$$\{[(((IncorrectOCquestion_1 + IncorrectOCquestion_2 + \ldots + IncorrectOCquestion_n)-n)*2) / 5n-n) - 1] \times -1\}$$

The score is then computed to between –1 and 1. A higher answer indicates the presence of overconfidence.

3.8. The research framework and the hypotheses

The assessment of an entrepreneur's cognitive risk propensity and level of financial sophistication will be tested within the predefined research framework. Existing lending technologies will be contrasted with the new evidence and areas identified where it is felt that supplementary information seems to benefit the creditworthiness assessment process. Hypotheses are then formulated.

3.8.1 Small Business Credit Scoring

The widespread and successful usage of SBCS (an analysis of the applicant's credit history incorporating past credit decisions) is evidence that a departure from the lending methodologies grounded in Modern Financial Theory is beneficial. In cases where an applicant has a rich credit history as a consequence of many credit transactions over several years, the score is influenced by the level of past rational

credit decisions made. Where there is little credit history, the score, if one can be produced, will be based on demographic information only, as little can be said about past decisions. This is likely to be a common feature at a nascent entrepreneurial level where younger, newer entrants to the credit market are attempting to start their business careers. An alternative insight into the levels of rational (not chronically risky) decision making tendencies would enable the loan officer to modify the SBCS to include this missing element, particularly at this nascent entrepreneurial level. In addition, it is expected that the CRP score should to some extent mirror the SBCS in cases where a rich credit history is a substantial element of that score. With more established entrepreneurs, this correlation should be more evident.

Hypothesis 1 is thus stated as follows:

H_1: The cognitive risk propensity (CRP score) will be positively correlated with the credit agency (Delphi score) rating (H_1).

Small Business Credit Scoring may give an indication as to the applicant's predisposition to risk taking, though no specific association has been directly demonstrated before. A correlation between the applicant's Delphi credit score (a key variable behind a Small Business Credit Score), and cognitive risk propensity (CRP score) may indicate that the applicant's personal credit history gives an indication of their business decision making prejudices and vice versa. Should this correlation be noteworthy, the finding may give rise to a useful lending tool for verification of the decision making tendencies of established entrepreneurs and previously unavailable insights into the nascent entrepreneur's risk propensity.

3.8.2 Financial Statement lending

Those who use and can present financial information assist the loan officer in framing the decision within the principles of Modern Finance Theory. The bank is able to demand and scrutinize the ratios and the borrower understands the ratios. All of the relevant information is available and reliable – thus fully informed and rational decisions can be made. Where the SMME borrower is not able to present the figures easily or is reluctant, behavioural finance theory should be considered if bankable

prospects within this sector are to be catered for. Alternatively, failure to comply with the bank's demands may indicate that those borrowers are not desirable prospects. Certain applicants may genuinely intend to provide all of the prescribed information though they are simply not capable. They wish for the bank to be fully informed and may even value the loan officer's insights and questions. As their firms grow, they may prioritise the acquisition of financial resources so that the required information is more readily available. Rather than reject all applicants who cannot provide the required financial information within the allowed time constraints, banks might reassess those entrepreneurs who value financial information and would provide the required information if it were available.

Overconfidence is the failure to know the limits of one's knowledge or ability resulting in the overestimation of one's certainty regarding facts or outcomes. The overconfident individual may be less inclined to search for information (Zacharakis and Shepherd, 2001) and may not value the insights of others. It is suggested that applicants demonstrating overconfidence will therefore be less inclined to utilise and rely on financial information as an integral aspect of the management function. This will be examined through the dual aspect of commercial numeracy (do low scorers on the commercial numeracy case study exhibit overconfidence) and financial information usage (do overconfident individuals make little usage and place little value on the various financial reports). Hypothesis 2 is thus stated as follows:

H_2: Overconfidence will be negatively correlated with financial sophistication (H_2).

A further question on bank loan officer's reluctance to lend to applicants who cannot meet the financial information demands must be posed: Is it misdirected? Can one conclusively assume that those less financially sophisticated entrepreneurs are more inclined to fail? Given that one's predisposition to taking risky decisions is an indicator of whether they are desirable candidates for a loan (Buttner and Rosen, 1988), establishing a correlation between financial sophistication and CRP may reveal whether the bank's reluctance to deal with this market is misplaced. Hypothesis 3 is thus stated as follows:

H_3: Financial sophistication will be positively correlated with cognitive risk propensity (more irrational decision making) (H_3).

Financial sophistication will be analysed on the two levels stated previously i.e. *commercial numeracy* and *extent of usage of financial information.*

3.8.3 Relationship lending

In instances where the lending institution has an established relationship with the loan applicant, the loan officer may have more certainty regarding the risk of loss attached to lending. In these circumstances, one might perceive there to be less incentive to demand collateral though previous research has found there to be conflicting evidence in this regard (Sharpe, 1990; Berger and Udell, 1995; Degryse and Van Cayseele, 2000). The lending institutions will generally demand collateral regardless of the length of the relationship, particularly in a sector where losses are more likely to occur. This situation will be exacerbated where many applicants do not have established relationships with the lending institutions. Rather than commit costly resources to a thorough investigation of the entrepreneur's prospects, the bank can reduce the risk of suffering a loss through collateral.

It is often argued that many entrepreneurs are precluded from accessing credit as they cannot afford the collateral. Alternatively, discouraged borrowers do not apply for loans as they expect that collateral will be demanded or they are unwilling to risk collateral. It is possible that rational entrepreneurs with sound business models do not apply for needed borrowings given their aversion to the risk of losing their collateral. Equally possible is the propensity of irrational entrepreneurs to post collateral given their chronic willingness to enter into highly risky transactions. Recent research in Japan has found that riskier borrowers are more willing to post collateral (Ono and Uesugi; 2009). Alternatively, high propensity to risk taking may be associated with a reluctance to post collateral as entrepreneurs sense the greater possibility of failure associated with the venture. This may depend on whether the applicants have collateral or not. Lending institutions have not concerned themselves with the motives behind the posting of collateral. The rationale has been less important than the physical assets. A greater understanding of the entrepreneur's

intentions might afford the bank the ability to lessen the collateral demands while not significantly increasing the risk of loss. Hypothesis 4 is thus stated as follows:

H_4: Collateral dread will be positively correlated with cognitive risk propensity (more rational decision making) (H_4).

An understanding of the loan applicant's predisposition to risk taking through the applicant's cognitive biases and willingness to post collateral provides a limited though useful alternative to the insights a bank officer would gain through a lengthy relationship with the entrepreneur. An additional insight of significant interest to the loan officer is the financial sophistication exhibited by the applicant. The loan officer may assume that the applicant's predisposition to posting collateral, coupled with the opacity of the information provided, carries with it an element of moral hazard. The applicant is aware of the true risks inherent in the project to be financed and the decision to post collateral is based on this knowledge. The loan officer is not privy to this information and must therefore demand collateral regardless of the true financial possibilities inherent in the project. Whether the level of financial sophistication influences the willingness of the applicant to post collateral is therefore of great interest to the lending officer. This collateral dread may be associated with a low level of financial management sophistication leading to a heightened uncertainty as to the chances of success. This heightened uncertainty may result from lack of information (the applicant does not make use of financial reports) or lack of commercial numeracy (the applicant does not understand basic financial concepts sufficiently). The collateral dread phenomenon will be analysed against both of these components. Hypothesis 5 is thus stated as follows:

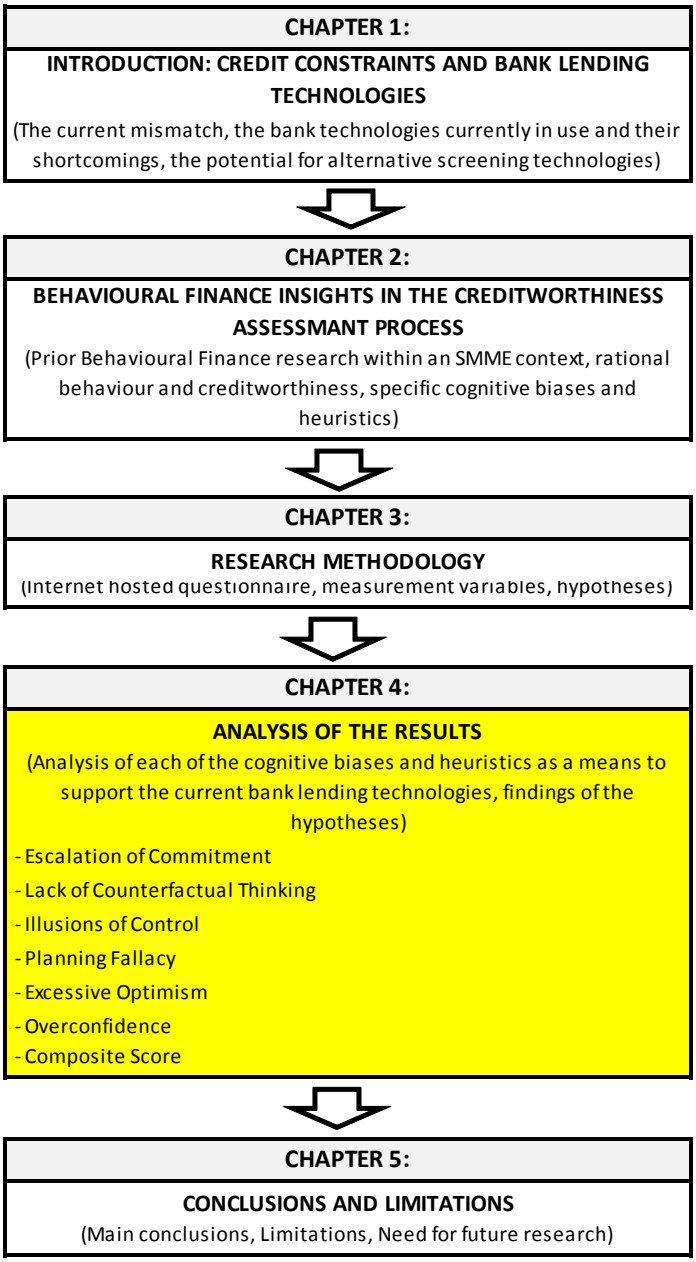
H_5: Collateral dread will be negatively correlated with financial sophistication (H_5).

3.9. Statistical analysis methodology

The distribution of many of the data sample fields was not normal and the sample sizes were relatively small. The nonparametric Spearman's correlation analysis was performed between each of the cognitive bias constructs within the CRP score as

well as the overall CRP score, Overconfidence score, Experian Delphi Credit Score, level of usage of financial, commercial numeracy and willingness to offer collateral. Evidence of correlations between the variables that were greater than 0.15, indicating a minor relationship, were analysed further and described. A Chi-Square test was conducted between each of the constructs within the CRP score and the Delphi Credit Score as further descriptive evidence. The correlations that emerged and the descriptions thereof were used as evidence in determining whether the hypotheses were supported.

Chapter 4 – Analysis of the Results



4.1 Chapter Introduction

A brief description of the questionnaire responses and sample stratification is outlined. Results and analyses are then presented by Cognitive Bias and Heuristic. Findings are then summarized and their implications in support of each of the hypotheses are discussed.

4.2. Introduction to results analysis

Each of the fifty respondents completed the online questionnaire (presented in print in Appendix A) in full. All of the responses were gathered and the variables detailed in Section 3.6 were calculated for each applicant. In order for the individual Cognitive Biases and overall CRP score to be calculated, responses were analysed and the most informative questions identified. Thereafter, the correlation analyses were performed and relationships analysed and described. Support for the various hypotheses were identified and then summarised.

4.3. Questionnaire responses

Each vignette contained six questions to which fifty respondents chose on a 5-point Likert scale to what extent they agreed or disagreed with a stated course of action. Answers of 4 or 5 indicate the more risky courses of action, and answers of 1 or 2, less risky approaches. See Appendix A for the questionnaire. Table 4.1 lists the scores calculated based on the responses to the questionnaire.

Table 4.1 Mean, Mode and Median for case study questions

Question Name	Mean	Mode	Median
LC1_software	1.94	2	2
LC2_strike	3.56	4	4
LC3_infoerror	4.56	5	5
LC4_reprimand	1.94	1	2
LC5_journal	1.36	1	1
LC6_priceerror	4.02	4	4
EC1_containers	2.72	2	2
EC2_roaster	3.08	4	4
EC3_shares	3.04	4	3.5
EC4_deposit	3.56	4	4
EC5_newtea	2.94	2	2
EC6_website	3.78	4	4
EO1_tender	2.28	2	2
EO2_technology	3.84	4	4
EO3_radios	2.94	4	3
EO4_sellshares	3.30	4	4
EO5_listing	3.70	4	4
EO6_insurance	1.98	1	2
IC1_auctions	3.62	4	4
IC2_cover	2.14	2	2
IC3_predict	2.56	2	2
IC4_rain	3.26	4	4
IC5_tender	2.86	2	2
IC6_import	2.30	2	2
PF1_lessloan	3.00	4	3.5
PF2_retrench	3.36	4	4
PF3_visit	2.52	2	2
PF4_marketing	2.40	2	2
PF5_launchttel	2.28	2	2
PF6_launchKyl	2.26	2	2

Key to Table 4.1

LC	Lack of Counterfactual Thinking
EO	Excessive Optimism
EC	Escalation of Commitment
IC	Illusion of Control
PF	Planning Fallacy

Nine of the fifty respondents answered the questions in Afrikaans and 41 in English. No applicants chose to answer the questionnaire in Zulu or Sotho. This choice was interesting – at least twenty (40%) of the applicants who completed the questionnaire were black entrepreneurs. Reasons for their language preference are beyond the scope of this study though the understanding of black entrepreneur's language preferences may yield valuable insights into the training and development of this important sector of the economy. There has been little in the way of serious studies

of the effects of language policy in South Africa on business efficiency and workplace productivity (Alexander, 1997; Webb, 2002).

In many instances, respondents overwhelmingly chose a similar course of action for a specific vignette question. Those questions did not adequately test for the loan applicant's propensity to irrational decision making relative to the remaining population of entrepreneurs applying for a similar loan and were therefore discounted. The responses that most informatively reveal evidence of cognitive biases will be those related to questions that yielded the most normal distributions of high and low risk responses. The mean should approximate three and the histogram should display an approximately equal stacking of responses around the centre (histograms for all questions are included in Appendix C). These risk propensity revealing questions were drawn from each of the cognitive biases tested barring the Lack of Counterfactual Thinking bias (as will be explained in section 4.6). They were then included in a calculation of the individual bias score and the overall (revised) Cognitive Risk Propensity (CRP) of each respondent and manipulated into a score of between –1 and 1. A low score indicates chronic evidence of the cognitive bias or heuristic.

The two most revealing questions from each cognitive bias were incorporated into both the assessment of each cognitive bias and the CRP score. All of the questions in the Lack of Counterfactual Thinking vignette failed to elicit sufficient evidence of an individual chronic lack or excess of the bias when compared to the population. This is evident from the widely varying mean (Table 4.1) and abnormal histogram spread (Figure 4.2) found in each of the Lack of Counterfactual Thinking questions. No questions were included in the calculation of the CRP scores for the applicants. Regarding the other biases, the questions listed in Table 4.2 were analysed further:

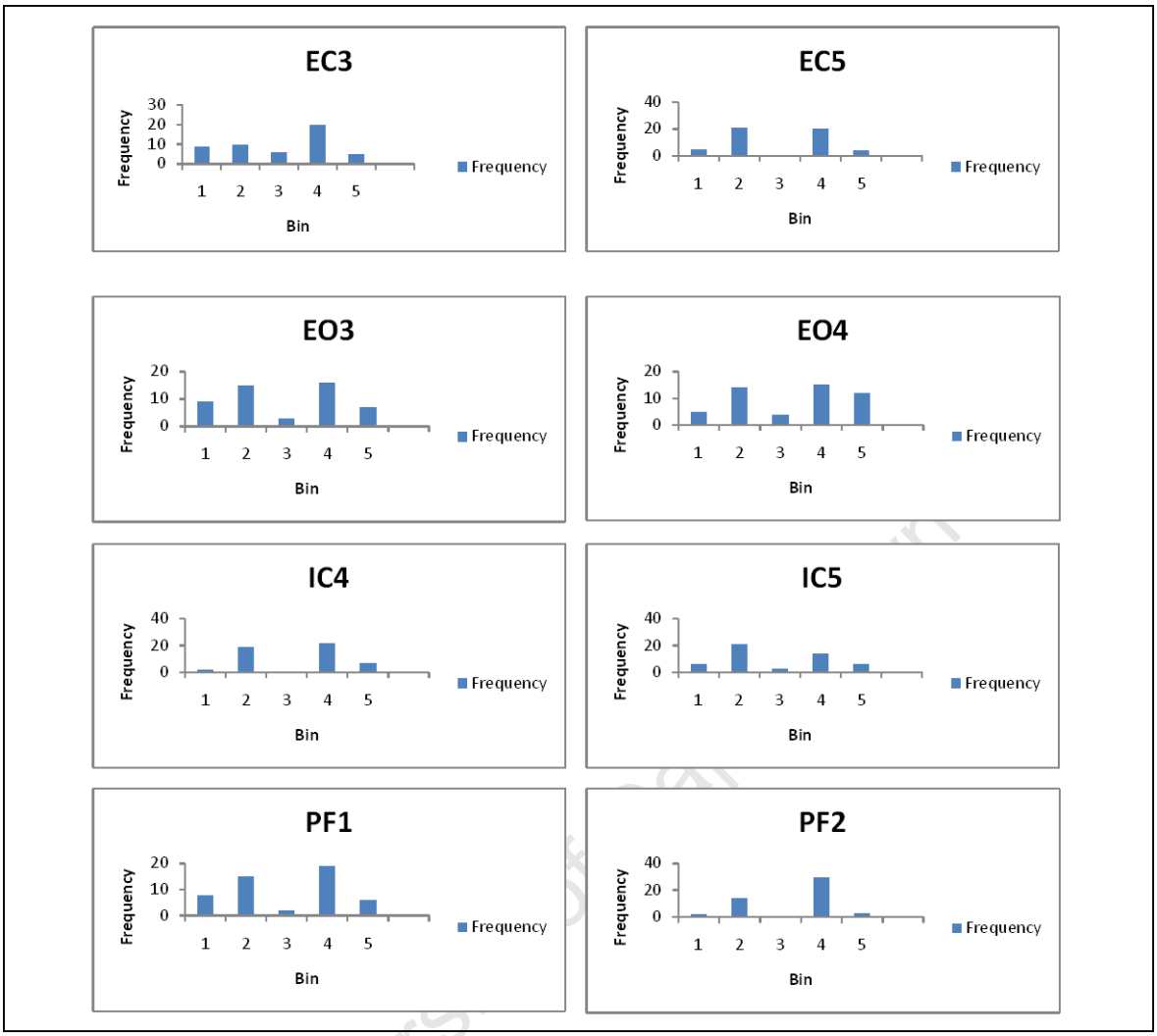
Table 4.2 Most informative Cognitive Bias questions

Question Name	Mean	Mode	Median
EC3_shares	3.04	4	3.5
EC5_newtea	2.94	2	2
EO3_radios	2.94	4	3
EO4_sellshares	3.30	4	4
IC4_rain	3.26	4	4
IC5_tender	2.86	2	2
PF1_lessloan	3.00	4	3.5
PF2_retrench	3.36	4	4

Histograms for each question reveal an even distribution of responses around the centre. A response of 1 or 2 indicates disagreement with a stated action while a response of 4 or 5 indicates agreement. These are presented in Figure 4.1.

The histograms reveal that applicants were sufficiently divided on the choice of a risk averse or risk taking approach to the business issue presented. From these questions, an indication of the loan applicant as a rational or irrational decision maker was developed within each of the cognitive bias constructs and a combination of the four biases as a whole.

Figure 4.1. Histogram of assessed questions



Key to Figure 4.1

EC	Escalation of Commitment
EO	Excessive Optimism
IC	Illusion of Control
PF	Planning Fallacy

4.4. Analysis and stratification of the questionnaire data

The relatively small sample size made it difficult to conclude as to the normality of the sample responses. For this reason, a nonparametric statistical analysis of the data was conducted and these finding were included in the correlation tables presented in Tables 4.3, 4.4 and 4.5.

Spearman's nonparametric correlation table (Table 4.3) presents the relationships that emerged between each of the questions, cognitive biases and the other measurement variables at the overall sample level:

Table 4.3. Nonparametric correlations – Sample Population

Correlations

			Experian Delphi Score	Cognitive Risk Propensity Score	Willingness to post collateral	Questions answered correctly	Overconfidence Score	Usage of Financial Information	Escalation of Commitment Score	Excessive Optimism Score	Illusion of Control Score	Planning Fallacy Score
Spearman's rho	Experian Delphi Score	Correlation Coefficient	1.000	.200	-.102	-.017	.070	-.054	.269	.189	.075	-.207
		Sig. (2-tailed)	.	.192	.510	.911	.650	.726	.077	.219	.631	.178
		N	44	44	44	44	44	44	44	44	44	44
	Cognitive Risk Propensity Score	Correlation Coefficient	.200	1.000	-.042	.110	.240	.060	.479**	.576**	.691**	.531**
		Sig. (2-tailed)	.192	.	.772	.447	.093	.678	.000	.000	.000	.000
		N	44	50	50	50	50	50	50	50	50	50
	Willingness to post collateral	Correlation Coefficient	-.102	-.042	1.000	.025	.226	.151	-.259	.175	-.029	.000
		Sig. (2-tailed)	.510	.772	.	.865	.115	.295	.069	.223	.842	.998
		N	44	50	50	50	50	50	50	50	50	50
	Questions answered correctly	Correlation Coefficient	-.017	.110	.025	1.000	.064	.256	.052	-.149	.267	.056
		Sig. (2-tailed)	.911	.447	.865	.	.659	.072	.721	.303	.061	.699
		N	44	50	50	50	50	50	50	50	50	50
	Overconfidence Score	Correlation Coefficient	.070	.240	.226	.064	1.000	.423**	.074	.072	.184	.144
		Sig. (2-tailed)	.650	.093	.115	.659	.	.002	.611	.619	.201	.317
		N	44	50	50	50	50	50	50	50	50	50
	Usage of Financial Information	Correlation Coefficient	-.054	.060	.151	.256	.423**	1.000	.150	-.049	.049	-.022
		Sig. (2-tailed)	.726	.678	.295	.072	.002	.	.300	.735	.734	.878
		N	44	50	50	50	50	50	50	50	50	50
	Escalation of Commitment Score	Correlation Coefficient	.269	.479**	-.259	.052	.074	.150	1.000	.036	.122	-.077
		Sig. (2-tailed)	.077	.000	.069	.721	.611	.300	.	.803	.399	.593
		N	44	50	50	50	50	50	50	50	50	50
	Excessive Optimism Score	Correlation Coefficient	.189	.576**	.175	-.149	.072	-.049	.036	1.000	.157	.122
		Sig. (2-tailed)	.219	.000	.223	.303	.619	.735	.803	.	.275	.398
		N	44	50	50	50	50	50	50	50	50	50
	Illusion of Control Score	Correlation Coefficient	.075	.691**	-.029	.267	.184	.049	.122	.157	1.000	.303*
		Sig. (2-tailed)	.631	.000	.842	.061	.201	.734	.399	.275	.	.033
		N	44	50	50	50	50	50	50	50	50	50
	Planning Fallacy Score	Correlation Coefficient	-.207	.531**	.000	.056	.144	-.022	-.077	.122	.303*	1.000
		Sig. (2-tailed)	.178	.000	.998	.699	.317	.878	.593	.398	.033	.
		N	44	50	50	50	50	50	50	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The sample population is further stratified by more established [2](more than one year's experience and a profit history) entrepreneurs in Table 4.4 and nascent (less than one year's experience and no profit history) entrepreneurs in Table 4.5.

[2] For ease of reading, 'more established entrepreneurs' will in future be referred to as 'established entrepreneurs'

Table 4.4. Established entrepreneur Spearman's nonparametric correlation table

Correlations

new IP6 Status=1 Established

			Experian Delphi Score	Cognitive Risk Propensity Score	Willingness to post collateral	Questions answered correctly	Overconfidence Score	Usage of Financial Information	Escalation of Commitment Score	Excessive Optimism Score	Illusion of Control Score	Planning Fallacy Score
Spearman's rho	Experian Delphi Score	Correlation Coefficient	1.000	.340	.120	-.028	.578**	.230	.469*	.102	.255	-.281
		Sig. (2-tailed)	.	.121	.595	.903	.005	.303	.028	.652	.251	.205
		N	22	22	22	22	22	22	22	22	22	22
	Cognitive Risk Propensity Score	Correlation Coefficient	.340	1.000	.104	-.059	.214	.009	.402*	.691**	.736**	.579**
		Sig. (2-tailed)	.121	.	.622	.779	.304	.968	.046	.000	.000	.002
		N	22	25	25	25	25	25	25	25	25	25
	Willingness to post collateral	Correlation Coefficient	.120	.104	1.000	.160	-.098	-.083	-.165	.265	.092	.010
		Sig. (2-tailed)	.595	.622	.	.446	.642	.693	.430	.201	.661	.963
		N	22	25	25	25	25	25	25	25	25	25
	Questions answered correctly	Correlation Coefficient	-.028	-.059	.160	1.000	.105	.222	-.056	-.185	.054	.005
		Sig. (2-tailed)	.903	.779	.446	.	.618	.286	.789	.375	.797	.981
		N	22	25	25	25	25	25	25	25	25	25
	Overconfidence Score	Correlation Coefficient	.578**	.214	-.098	.105	1.000	.418*	.440*	.129	.128	-.257
		Sig. (2-tailed)	.005	.304	.642	.618	.	.037	.028	.539	.542	.216
		N	22	25	25	25	25	25	25	25	25	25
	Usage of Financial Information	Correlation Coefficient	.230	.009	-.083	.222	.418*	1.000	.243	.118	.017	-.347
		Sig. (2-tailed)	.303	.968	.693	.286	.037	.	.242	.574	.936	.089
		N	22	25	25	25	25	25	25	25	25	25
	Escalation of Commitment Score	Correlation Coefficient	.469*	.402*	-.165	-.056	.440*	.243	1.000	.123	-.060	-.053
		Sig. (2-tailed)	.028	.046	.430	.789	.028	.242	.	.557	.776	.800
		N	22	25	25	25	25	25	25	25	25	25
	Excessive Optimism Score	Correlation Coefficient	.102	.691**	.265	-.185	.129	.118	.123	1.000	.381	.270
		Sig. (2-tailed)	.652	.000	.201	.375	.539	.574	.557	.	.061	.192
		N	22	25	25	25	25	25	25	25	25	25
	Illusion of Control Score	Correlation Coefficient	.255	.736**	.092	.054	.128	.017	-.060	.381	1.000	.325
		Sig. (2-tailed)	.251	.000	.661	.797	.542	.936	.776	.061	.	.113
		N	22	25	25	25	25	25	25	25	25	25
	Planning Fallacy Score	Correlation Coefficient	-.281	.579**	.010	.005	-.257	-.347	-.053	.270	.325	1.000
		Sig. (2-tailed)	.205	.002	.963	.981	.216	.089	.800	.192	.113	.
		N	22	25	25	25	25	25	25	25	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.5. Nascent entrepreneur Spearman's nonparametric correlation table

Correlations

new IP6 Status=2 Nascent

			Experian Delphi Score	Cognitive Risk Propensity Score	Willingness to post collateral	Questions answered correctly	Overconfidence Score	Usage of Financial Information	Escalation of Commitment Score	Excessive Optimism Score	Illusion of Control Score	Planning Fallacy Score
Spearman's rho	Experian Delphi Score	Correlation Coefficient	1.000	.015	-.313	-.046	-.313	-.258	.020	.174	-.119	-.118
		Sig. (2-tailed)	.	.948	.156	.838	.156	.246	.931	.440	.597	.602
		N	22	22	22	22	22	22	22	22	22	22
	Cognitive Risk Propensity Score	Correlation Coefficient	.015	1.000	-.193	.367	.244	.130	.602**	.361	.643**	.505*
		Sig. (2-tailed)	.948	.	.356	.071	.239	.535	.001	.076	.001	.010
		N	22	25	25	25	25	25	25	25	25	25
	Willingness to post collateral	Correlation Coefficient	-.313	-.193	1.000	-.095	.502*	.368	-.283	.101	-.149	-.053
		Sig. (2-tailed)	.156	.356	.	.651	.011	.070	.170	.632	.477	.801
		N	22	25	25	25	25	25	25	25	25	25
	Questions answered correctly	Correlation Coefficient	-.046	.367	-.095	1.000	.057	.316	.189	-.126	.530**	.118
		Sig. (2-tailed)	.838	.071	.651	.	.787	.124	.364	.548	.006	.575
		N	22	25	25	25	25	25	25	25	25	25
	Overconfidence Score	Correlation Coefficient	-.313	.244	.502*	.057	1.000	.355	-.116	.051	.236	.411*
		Sig. (2-tailed)	.156	.239	.011	.787	.	.081	.580	.810	.255	.041
		N	22	25	25	25	25	25	25	25	25	25
	Usage of Financial Information	Correlation Coefficient	-.258	.130	.368	.316	.355	1.000	.170	-.145	.144	.178
		Sig. (2-tailed)	.246	.535	.070	.124	.081	.	.416	.489	.493	.394
		N	22	25	25	25	25	25	25	25	25	25
	Escalation of Commitment Score	Correlation Coefficient	.020	.602**	-.283	.189	-.116	.170	1.000	-.056	.308	-.054
		Sig. (2-tailed)	.931	.001	.170	.364	.580	.416	.	.789	.134	.796
		N	22	25	25	25	25	25	25	25	25	25
	Excessive Optimism Score	Correlation Coefficient	.174	.361	.101	-.126	.051	-.145	-.056	1.000	-.157	-.030
		Sig. (2-tailed)	.440	.076	.632	.548	.810	.489	.789	.	.455	.887
		N	22	25	25	25	25	25	25	25	25	25
	Illusion of Control Score	Correlation Coefficient	-.119	.643**	-.149	.530**	.236	.144	.308	-.157	1.000	.321
		Sig. (2-tailed)	.597	.001	.477	.006	.255	.493	.134	.455	.	.118
		N	22	25	25	25	25	25	25	25	25	25
	Planning Fallacy Score	Correlation Coefficient	-.118	.505*	-.053	.118	.411*	.178	-.054	-.030	.321	1.000
		Sig. (2-tailed)	.602	.010	.801	.575	.041	.394	.796	.887	.118	.
		N	22	25	25	25	25	25	25	25	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.5. Introduction to findings presentation

The aim of this research is to determine whether alternative lending technologies centred on the entrepreneur's propensity to rational decision making can support traditional lending technologies. Findings of the statistical analyses are presented accordingly. Initially, Individual cognitive biases are analysed and explained independently of each other. Based on the relationships that emerge, the implications for existing lending technologies are discussed. Established and nascent entrepreneurs will be contrasted to highlight the potential impact of behavioural finance insights within more stratified entrepreneurial classes. Correlations of less than 0.15 are considered inconclusive and will not be discussed. Correlations between 0.15 and 0.35 are considered minor. Correlations above 0.36

and 0.50 are considered moderate. Correlations that are greater than 0.50 are considered strong.

4.6. Escalation of Commitment

CHAPTER 4:
ANALYSIS OF THE RESULTS (Analysis of each of the cognitive biases and heuristics as a means to support the current bank lending technologies, findings of the hypotheses)
- Escalation of Commitment
- Lack of Counterfactual Thinking
- Illusions of Control
- Planning Fallacy
- Excessive Optimism
- Overconfidence
- Composite Score

Table 4.6 indicates that at an overall sample population level, no strong correlations emerged between the Escalation of Commitment bias and any of the other constructs under investigation, though some minor and moderate correlations warrant further discussion. These will be analysed within the context of each of the existing lending technologies.

4.6.1. Correlation insights

Table 4.6. Escalation of Commitment Spearman correlation coefficients

Escalation of Commitment	**Small Business Credit Scoring**	**Financial Statement lending**			**Relationship lending**
	Delphi	Commercial Numeracy	Usage of Financial information	Overconfidence	Willingness to post collateral
Overall Sample	0.269	0.052	0.150	0.074	0.259
Established entrepreneurs	0.469	-0.056	0.243	0.440	0.165
Nascent Entrepreneurs	0.020	0.189	0.170	-0.116	0.283

4.6.2. Escalation of Commitment and Small Business Credit Scoring

The Delphi score is comprised of both demographic information (such as age and gender) and past performance on loans and other forms of credit. The distribution of the Delphi scores was not normal for the sample nor for both the nascent and established entrepreneurial sub-sets. Scores were tightly distributed within a particularly narrow range that gave little indication of creditworthiness. This suggests that minimal credit history was available to generate a truly reflective *credit* score for many of the loan applicants in both entrepreneurial classes. Nevertheless, a moderate relationship seemed to exist when comparing evidence of the Escalation of Commitment bias at the established level (0.469) while no apparent relationship existed at the nascent entrepreneurs (0.020), suggesting that the established entrepreneurial scores may have been influenced to a greater degree by non demographic information. The correlation at the established entrepreneurial level was significant at the 0.05 level. Since evidence of the Escalation of Commitment bias within the decision making process seems to also indicate poor credit decisions, the relationship at the established level may be pragmatically useful.

A Chi-Square test was performed to test for independence of the two constructs. While one cannot conclude as to significant relationships due to the small sample size, the table of findings is included (Table 4.7). The test reaffirms that entrepreneurs with higher Delphi scores tended to make more risk averse decisions.

Table 4.7. Escalation of Commitment – Delphi score Chi-Square test

Crosstab

			Escalation of Commitment CAT			
			1 -.2 and less	2 -.2 - .2	3 .2 and more	Total
experiancat Experian cat	1 584 and less	Count	6	4	3	13
		Expected Count	4.4	3.9	4.7	13.0
		% within experiancat Experian cat	46.2%	30.8%	23.1%	100.0%
		% within EC_SELECT_CAT EC SELECT CAT	35.3%	26.7%	16.7%	26.0%
	2 585 - 590	Count	7	9	9	25
		Expected Count	8.5	7.5	9.0	25.0
		% within experiancat Experian cat	28.0%	36.0%	36.0%	100.0%
		% within EC_SELECT_CAT EC SELECT CAT	41.2%	60.0%	50.0%	50.0%
	3 591 and higher	Count	4	2	6	12
		Expected Count	4.1	3.6	4.3	12.0
		% within experiancat Experian cat	33.3%	16.7%	50.0%	100.0%
		% within EC_SELECT_CAT EC SELECT CAT	23.5%	13.3%	33.3%	24.0%
Total		Count	17	15	18	50
		Expected Count	17.0	15.0	18.0	50.0
		% within experiancat Experian cat	34.0%	30.0%	36.0%	100.0%
		% within EC_SELECT_CAT EC SELECT CAT	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.101[a]	4	.541
Likelihood Ratio	3.198	4	.525
Linear-by-Linear Association	1.413	1	.235
N of Valid Cases	50		

a. 6 cells (66.7%) have expected count less than 5. The minimum expected count is 3.60.

The correlation found between the Escalation of Commitment bias and the Delphi score (0.469) implies that established entrepreneurs influenced by the Escalation of Commitment bias are more likely to possess a poor credit history. These entrepreneurs are likely to commit themselves to an unaffordable loan despite feedback indicating that the project returns will not be sufficient to service the debt.

Both the Escalation of Commitment score and the Delphi score are intended to quantify the level of risk inherent in the loan applicant. A strong correlation between the two, particularly at the established entrepreneurial level, would indicate a useful creditworthiness tool. In the instance that an inconclusive Delphi score was generated for a particular loan applicant with little or no credit history, an informative Escalation of Commitment score might provide the necessary information as to the applicant's ability to repay the loan.

4.6.3. Escalation of Commitment and Financial Statement lending

It may be assumed that loan applicants that present financial information to the lending institution are able to interpret that information. Frequently, at the SMME level, it emerges that the applicant is not able to interpret and discuss that information adequately (Fisher, 2009). It then becomes more difficult to rely upon this information as part of the decision making process since any technical questions that emerge cannot be adequately answered.

At the established level, minor to moderate correlations emerged between the Escalation of Commitment bias and both the regularity with which the entrepreneurs utilize financial information (0.243) and their levels of overconfidence (0.440). The correlation with overconfidence was significant at the 0.05 level. These relationships were less evident at the nascent entrepreneurial level.

In addition, a relationship emerged between commercial numeracy and level of usage of financial information at the overall sample level (0.256) and when stratified by entrepreneurial groups (0.222 for established entrepreneurs; 0.316 for nascent entrepreneurs). This relationship suggests that more commercially literate entrepreneurs make greater usage of financial reports given their understanding of the information contained therein.

4.6.3.1. Financial information usage

Nascent entrepreneurs are said to be lacking in financial management skills (Schoombee, 2004; GEM, 2003). Few micro enterprises keep or comply with financial record keeping requirements. It was therefore expected that a minor relationship (0.170) would emerge at a nascent level when analysing usage of financial information, since previous research findings indicated that many nascent entrepreneurs (rational or otherwise) made little usage of financial information (Finscope, 2006). Marginally more revealing is the correlation at the established entrepreneurial level (0.243). Established entrepreneurs who are more inclined to re-commit to a previous course of action even when faced with negative feedback are those who make less usage of financial information.

Two scenarios are suggested in analysing the direction of causation:

The presence of the Escalation of Commitment bias causes the entrepreneur to use financial information less

Biased entrepreneurs may look to avoid disproving their questionable decisions with numbers that contradict their mind-set. Less biased entrepreneurs make more regular use of financial information, however many SMME business owners (knowingly or otherwise) manipulate their company results to create an illusory image of financial health for presentation to lenders (von Blottnitz, 2009). Where the information is manipulated and unreliable, one might have expected those entrepreneurs more influenced by the Escalation of Commitment bias to regularly use the financial information. No evidence was found to support this. Rather, those entrepreneurs more influenced by the Escalation of Commitment bias, making less regular usage of financial information might be those inclined to manipulate their figures.

The difficulty in assessing which of the loan applicants has presented a true picture of past and future trading and which hasn't is a catalyst for the widespread practice of requesting collateral. Prior knowledge of the applicant's predisposition to the Escalation of Commitment bias may shed some light on the validity of both the financial information that has been presented and the owner's interpretation of those results.

Usage of financial information results in less escalation of commitment

In this scenario, the financial information that is available is habitually checked and results in the entrepreneur relying on the information without being influenced by the Escalation of Commitment bias. Research indicating that SMME financial information is often manipulated, makes this scenario unlikely. It is more likely that questionable financial information intensifies the need for alternative methods to reduce the uncertainty inherent in a creditworthiness decision involving limited information.

Prior knowledge of the applicant's predisposition to the Escalation of Commitment bias may shed further evidence on whether the financial information has been (knowingly or unknowingly) manipulated or misinterpreted. This may enable the loan officer to adjust the level to which reliance is placed on financial information presented as part of the creditworthiness decision.

4.6.3.2. Overconfidence

A moderate correlation was found with regards to established entrepreneurs (0.440), which was significant at the 0.05 level. An inconclusive correlation was found amongst nascent entrepreneurs (-0.116) though the direction differed. While at an established entrepreneurial level, loan applicants that are not influenced by the Escalation of Commitment bias are likely to exhibit overconfidence, at the nascent level, the relationship was not found. These more experienced entrepreneurs will be more considerate of the negative feedback that they receive and more confident of the correctness of their ultimate decisions. They will be more willing to reverse their decisions, but less mindful of third party advice as to whether the revised decision is correct. However, regarding nascent entrepreneurs, negative feedback is considered less frequently (the nascent candidates had a lower average Escalation of Commitment score than the established entrepreneurs) though this trend gives little insight into their tendencies towards overconfidence.

Within the Escalation of Commitment construct, higher overconfidence is generally associated with lower levels of risk taking. This conflicts with the normative view from the perspective of the lending institution. Where overconfidence manifests in the entrepreneur's reluctance to take advice from the loan officer, the venture is currently regarded as more risky. While one cannot assume the opposite to be true (particularly at the nascent entrepreneurial level), the finding suggests that rational decision makers may be more confident in their own abilities and less confident of others. The established entrepreneurs' reluctance to include loan officers in business decision making processes should be further understood in the light of the project and not dismissed as a signal of riskiness.

The distinct divergence in results between the established and nascent entrepreneurial classes may also be of use to the lending institution. This difference was also evident in the Planning Fallacy correlation results albeit with an opposite effect. It is perhaps indicative of the heightened need for segregated data pools and distinct assessment methodologies when screening the financial information and behavioural characteristics of the two entrepreneurial classes.

4.6.4. Escalation of Commitment and Relationship Lending

A minor correlation emerged between the Escalation of Commitment bias and the willingness with which the entrepreneur was prepared to post collateral (0.259). This relationship was marginally more evident at the nascent entrepreneurial level (0.283).

4.6.4.1. Willingness to post collateral

The act of posting collateral reduces the lender's risk of suffering a loss should the entrepreneur default on the loan. In addition, it is a signal to the bank that the applicant believes that the project is viable and will endeavour to make it a success. It is an indicator from the borrower's perspective of commitment to the project. One might expect that entrepreneurs influenced by the Escalation of Commitment bias would be more willing to post collateral. The loan officer's post due diligence findings that the project is more risky than initially expected and will require collateral might further entrench this entrepreneur's commitment. The positive relationship that emerged between evidence of the Escalation of Commitment bias and willingness to post collateral at the established entrepreneurial level, though minor, gives support to this scenario.

A relationship at the nascent entrepreneurial level was slighter more evident. Nascent entrepreneurs in a necessity driven environment with few employment alternatives might further entrench themselves in funding decisions for several reasons:

- They may view their willingness to commit as sending a strong signal to the bank of the viability of the project.

- They often do not have the collateral available, thus there is no real loss to them should the business fail.

If it is known by the lending institution that the entrepreneur is not influenced by the Escalation of Commitment bias, it is likely that the applicant will be less willing to post collateral. Thus greater willingness to post collateral should not necessarily be regarded as a signal that the project is viable and rests on strictly rational foundations. In fact, it might be a signal that further investigation into the viability of the project is recommended.

4.6.5. Escalation of Commitment findings implications

The relationships that emerged indicate that the alternative sources of data generated can supplement the existing lending technologies within the framework of the Escalation of Commitment bias. Limited support for hypotheses 1, 3 and 4 was revealed. These findings seem to be more relevant amongst established entrepreneurs in the instances that the lending institution relies on SBCS or financial statement lending. Where the SBCS or financial information was not sufficient to yield a clear creditworthiness decision, evidence of the Escalation of Commitment bias within the more established entrepreneur's decision making process might further reduce the information opacity.

Where the lending institution relies on relationship lending, the alternative sources of data may provide more comfort when assessing nascent entrepreneurs. This finding however includes a discouraging drawback. Relationship lending typically occurs when the lending institution already has a credit history with the loan applicant. The loan officer cannot rely on a past relationship where none has occurred. Consequently, additional information on the likelihood of a nascent applicant making rational decisions cannot reduce the level of decision uncertainty within a relationship lending framework. The loan officer is forced to assess the entrepreneur's application with other lending technologies which seem to be less informative at the nascent level.

4.7. Lack of Counterfactual Thinking

CHAPTER 4:
ANALYSIS OF THE RESULTS (Analysis of each of the cognitive biases and heuristics as a means to support the current bank lending technologies, findings of the hypotheses)
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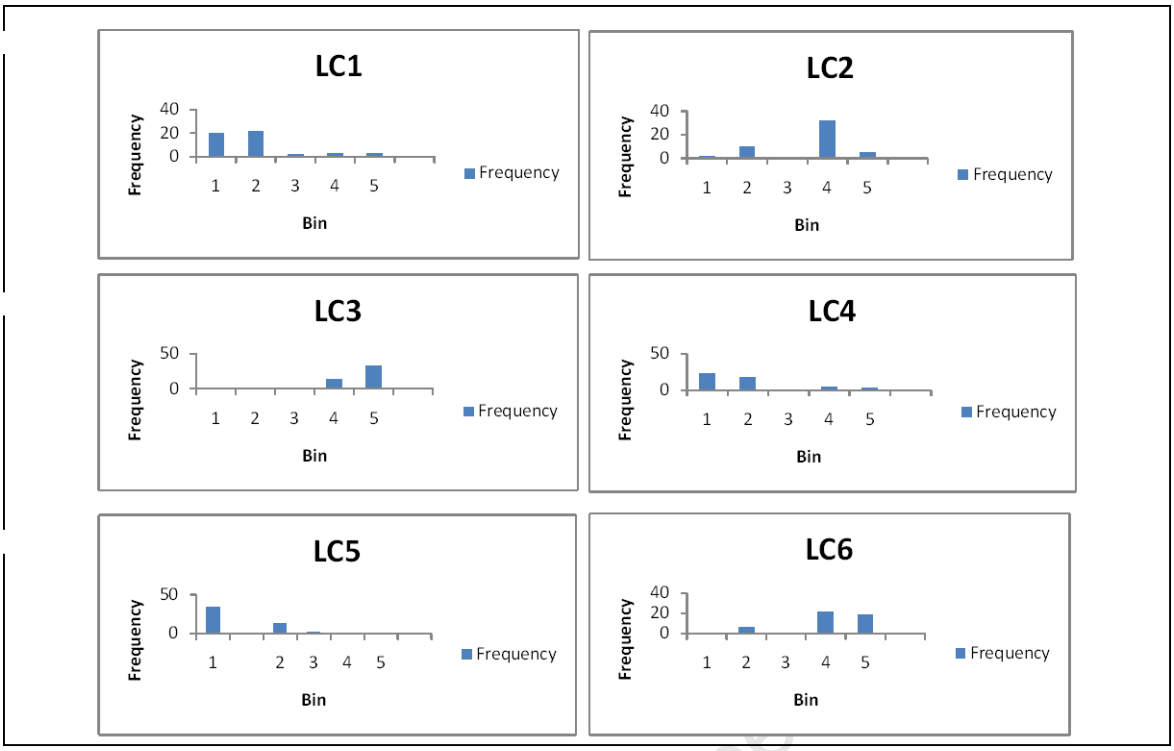
- Planning Fallacy
- Excessive Optimism
- Overconfidence
- Composite Score

4.7.1 Correlation insights

With regard to all questions included in the Lack of Counterfactual Thinking case study, the response mean did not closely approximate three and the response distribution as evident in histograms in Figure 4.2 was not normal.

All questions rendered a high degree of consensus of action whether by way of demonstrating the Lack of Counterfactual Thinking bias or the opposite. This may mean that the questions did not test respondent's degree of predisposition to risk taking sufficiently or that certain scenarios test simultaneously for low risk and high risk dispositions, rendering inconclusive evidence depending on the variables present.

Figure 4.2 Lack of Counterfactual Thinking histograms



It is likely that the questions included in the case study elicited responses that did not test exclusively for Counterfactual Thinking or a lack thereof. By treating all low risk choices as a 1 (answers of 1 and 2 on the 5 Point Likert scale) and all high risk answers as a 2 (answers of 4 or 5 on the Likert scale), a comparison of respondents to questions LC3 and LC5 reveals that 49 of the fifty exhibited a lack of counterfactual thinking in LC3 and simultaneously presence of counterfactual thinking in LC5.

In terms of Lack of Counterfactual Thinking risk predispositions, Table 4.8 demonstrates further examples of the high incidence of contradictory positions taken by respondents.

Table 4.8. Lack of Counterfactual Thinking bias – contradictory responses

Examples of contradictory positions taken among differing question sets (N = 50)					
Question sets	**LC1 & LC3**	**LC3 & LC4**	**LC3 & LC5**	**LC4 & LC5**	**LC3 & LC6**
No. of contradictory positions	**44 (88%)**	**44 (88%)**	**49 (98%)**	**40 (80%)**	**41 (83%)**

The results do not lend themselves to analysing or concluding as to the presence or absence of the Lack of Counterfactual Thinking bias amongst loan applicants. It thus becomes impractical to determine whether correlations between the Lack of Counterfactual Thinking bias and the other variables under scrutiny exist. It was not possible to re-examine the loan applicants that formed part of the research fieldwork for the Lack of Counterfactual Thinking bias. Nor was it possible to extend the questionnaire using new loan applicants without incurring considerable delay and little assurance of successfully sourcing willing participants. Due to the high level of contradictory stances in this particular case study and the difficulties in re-performing this specific test, Lack of Counterfactual Thinking will not be advanced as a variable towards developing an overall predisposition to risk taking score utilizing evidence of cognitive biases within the context of this study. The purpose of the research was not to determine whether the Lack of Counterfactual Thinking bias exclusively could give further creditworthiness insights beyond the limitations of current lending technologies. Nevertheless, evidence of the bias may yet offer insights and useful intuition into the creditworthiness of SMME entrepreneurs and is mentioned as an item worthy of future research based on past research included in the literature review (Roese, 1997; Baron, 1999; Galinsky et al, 2002).

4.8. Illusion of Control

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ANALYSIS OF THE RESULTS (Analysis of each of the cognitive biases and heuristics as a means to support the current bank lending technologies, findings of the hypotheses)
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- Illusions of Control
- Planning Fallacy
- Excessive Optimism
- Overconfidence
- Composite Score

Table 4.9 indicates that at an overall sample population level, no strong correlations emerged between the illusions of control bias and any of the other constructs under investigation though there were minor and strong correlations that warrant further discussion in certain cases, particularly when analysed at a stratified sample level. These will be analysed within the context of each of the existing lending technologies.

4.8.1. Correlation insights

Table 4.9. Illusion of Control – Spearman correlation coefficients

Illusion of Control	**Small Business Credit Scoring**	**Financial Statement lending**			**Relationship lending**
	Delphi	Commercial Numeracy	Usage of Financial information	Overconfidence	Willingness to post collateral
Overall Sample	0.075	0.267	0.049	0.184	0.029
Established entrepreneurs	0.026	0.054	0.017	0.128	-0.092
Nascent Entrepreneurs	-0.119	0.530	0.144	0.236	-0.149

4.8.2. Illusion of Control and Small Business Credit Scoring

The Spearman correlation test yielded no relationship between the Delphi score and evidence of the Illusion of Control bias. Findings of a Chi-Square test are presented in Table 4.10. A minor trend is reflected when analysing the scores within three broad groupings, particularly among the lower scoring applicants.

The relationship seemed to be more evident amongst entrepreneurs with lower Delphi scores. These applicants generally seemed to be more influenced by the Illusion of Control bias.

Table 4.10 Illusion of Control – Delphi Score Chi-Square Test

Crosstab

			Illusions of Control CAT			
			1 -.2 and less	2 -.2 - .2	3 .2 and more	Total
experiancat Experian cat	1 584 and less	Count	7	5	1	13
		Expected Count	4.9	3.9	4.2	13.0
		% within experiancat Experian cat	53.8%	38.5%	7.7%	100.0%
		% within IC_SELECT_CAT IC SELECT CAT	36.8%	33.3%	6.3%	26.0%
	2 585 - 590	Count	8	5	12	25
		Expected Count	9.5	7.5	8.0	25.0
		% within experiancat Experian cat	32.0%	20.0%	48.0%	100.0%
		% within IC_SELECT_CAT IC SELECT CAT	42.1%	33.3%	75.0%	50.0%
	3 591 and higher	Count	4	5	3	12
		Expected Count	4.6	3.6	3.8	12.0
		% within experiancat Experian cat	33.3%	41.7%	25.0%	100.0%
		% within IC_SELECT_CAT IC SELECT CAT	21.1%	33.3%	18.8%	24.0%
Total		Count	19	15	16	50
		Expected Count	19.0	15.0	16.0	50.0
		% within experiancat Experian cat	38.0%	30.0%	32.0%	100.0%
		% within IC_SELECT_CAT IC SELECT CAT	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.437[a]	4	.115
Likelihood Ratio	8.196	4	.085
Linear-by-Linear Association	1.375	1	.241
N of Valid Cases	50		

a. 6 cells (66.7%) have expected count less than 5. The minimum expected count is 3.60.

Entrepreneurs labouring under the Illusion of Control bias may assume that external factors such as interest rates and asset market values will move in their favour. Loan terms will therefore seem more appealing and achievable. When the variables

remain constant or deteriorate, these entrepreneurs may be placed in a position where they are forced to default on their loans.

When screening entrepreneurs for creditworthiness, it may be useful for the loan officer to have additional insights into the payment prospects of loan applicants. Given a stronger correlation between the Delphi score or other credit rating agency score, screening for the Illusion of Control bias might give the loan officer more evidence of creditworthiness, where an inconclusive Delphi score emerged.

4.8.3. Illusion of Control and financial statement lending

Relationships emerged between the Illusion of Control bias and both the entrepreneur's commercial numeracy skills and their level of overconfidence. These correlations were more evident at the nascent entrepreneurial level.

4.8.3.1. Commercial numeracy

No relationship emerged between commercial numeracy at the established entrepreneurial level though at a nascent entrepreneurial level, a strong relationship (0.530) was revealed. This was found to be significant at the 0.01 level. This indicates that amongst nascent entrepreneurs with an understanding of basic financial calculations and concepts, their decisions are less influenced by uncontrollable external factors.

As an example, a nascent entrepreneur may have recently calculated the direct and overhead costs of the stock that will be merchandised. Whilst the current costs are available, the entrepreneur will not assume that the more volatile inputs such as transport costs will remain unchanged and margin for short term increases will be considered. The nascent entrepreneur who lacks these commercial skills may anticipate that variations in external costs will not affect their product costs or will always be of benefit to them. The costing calculations are therefore seen as overly complicated and unnecessary.

When reviewing a nascent entrepreneurial business plan, this finding may be of great significance to a loan officer. If it is known beforehand that the applicant is influenced by the Illusion of Control bias, several assumptions that are used in the projection of revenues and profits might be carefully reconsidered given the entrepreneur's level of experience.

4.8.3.2. Overconfidence

Amongst nascent entrepreneurs, a minor correlation emerged between the Illusion of Control bias and overconfidence (0.236), though the correlation was not within meaningful significance levels. The less influenced by the Illusion of Control bias, the more overconfident the entrepreneur appeared to be.

This relationship seems understandable, particularly amongst nascent entrepreneurs where the entrepreneur is likely to have little experience in dealing with external factors. Overconfidence when making a rational decision relating to a transaction that is dependent on factors beyond the entrepreneur's ability to influence may be appropriate, particularly when third party funding is at stake. However, this relationship may be of concern should it result in the inability to act. Overconfidence should not extend to a dismissal of all relevant information in favour of simply regarding controllable factors as beyond one's ability to influence. Should the nascent entrepreneur anticipate that market forces are too unpredictable to initiate planned activities, rather than consult with the appropriate parties to reduce market uncertainty, opportunities may be lost.

Loan officer's knowledge of the applicant's predisposition to the Overconfidence bias may give insight into the development of the business plan and prospects of the nascent entrepreneur. A stronger correlation with the Illusion of Control bias would indicate that the entrepreneur is not susceptible to taking excessive risks on uncontrollable market forces. This might be a favourable factor amongst entrepreneurs who utilize and understand financial information. Amongst entrepreneurs who do not rely on financial information, this may signal evidence of complacency.

4.8.4. Illusion of Control findings implications

The relationships that emerged indicate that the alternative sources of data generated can supplement the existing lending technologies within the framework of the Illusion of Control bias. Support for hypothesis 3 was revealed. Whilst there seemed to be little additional support for SBCS, financial institutions that rely primarily on financial statements may gain further certainty on an individual's creditworthiness by having insight into evidence of the Illusion of Control bias. Contrary to the evidence that emerged within the Escalation of Commitment bias, this relationship was more apparent amongst nascent entrepreneurs.

The findings are particularly useful when the creditworthiness decision is to be largely based on the presentation of financial statements, budgets and management accounts and the applicant is a nascent entrepreneur. Where the nascent entrepreneur is able to present budgets and forecasts, and is not overly influenced by the Illusion of Control bias, the loan officer might be able to place further reliance on the presented figures. Alternatively, where it is known that a nascent entrepreneur is chronically influenced by the Illusion of Control bias, forecasts should be more suspiciously considered. This relationship was not found amongst established entrepreneurs. In these instances, where uncertainty around the integrity of the forecasts remains, the loan officer is able to request audited historical figures.

4.9. Planning fallacy

CHAPTER 4:
ANALYSIS OF THE RESULTS (Analysis of each of the cognitive biases and heuristics as a means to support the current bank lending technologies, findings of the hypotheses)
- Escalation of Commitment
- Lack of Counterfactual Thinking
- Illusions of Control
- Planning Fallacy
- Excessive Optimism
- Overconfidence
- Composite Score

4.9.1. Correlation insights

Table 4.11 indicates that at an overall sample population level, no strong correlations emerged between the Planning Fallacy bias and any of the other constructs under investigation though there were minor and moderate (often unexpected) correlations that warrant further discussion in certain cases. These will be analysed within the context of each of the existing lending technologies.

Table 4.11. Planning Fallacy – Spearman correlation coefficients

Planning Fallacy	**Small Business Credit Scoring**	**Financial Statement lending**			**Relationship lending**
	Delphi	Commercial Numeracy	Usage of Financial information	Overconfidence	Willingness to post collateral
Overall Sample	-0.207	0.056	-0.022	0.144	0.000
Established entrepreneurs	-0.281	0.005	-0.347	-0.257	-0.010
Nascent Entrepreneurs	-0.118	0.118	0.178	0.411	0.053

4.9.2. Planning Fallacy and Small Business Credit Scoring

Minor correlations were found between the Delphi credit score and the Planning Fallacy score at the overall sample level (-0.207) though Hypothesis 1 was not supported. This relationship was largely due to findings at the established entrepreneurial level (-0.281). At the nascent level, the relationship was largely inconclusive. A Chi –Square test was performed to further analyse the relationship between the Planning Fallacy bias and the Delphi score. Though the sample size is too small to conclude as to the statistical significance of the relationship, findings are included in Table 4.12.

The Chi-Square test indicates that entrepreneurs with the lower Delphi Credit scores tended to be more influenced by the Planning Fallacy bias. However applicants with higher Delphi scores tended to score less conclusively in the Planning Fallacy test suggesting that they were neither overly nor slightly influenced by the Planning Fallacy bias. A counterintuitive relationship emerged amongst the more established group where applicants with better credit scores seemed to make more irrational decisions. The finding may describe the entrepreneur who has in the past achieved what was thought to be overly ambitious rather than be in default.

Table 4.12 Planning Fallacy – Delphi Score Chi-Square Test

Crosstab

			Planning Fallacy CAT			
			1 -.2 and less	2 -.2 - .2	3 .2 and more	Total
experiancat Experian cat	1 584 and less	Count	8	2	3	13
		Expected Count	5.2	4.7	3.1	13.0
		% within experiancat Experian cat	61.5%	15.4%	23.1%	100.0%
		% within PF_SELECT_CAT PF SELECT CAT	40.0%	11.1%	25.0%	26.0%
	2 585 - 590	Count	8	8	9	25
		Expected Count	10.0	9.0	6.0	25.0
		% within experiancat Experian cat	32.0%	32.0%	36.0%	100.0%
		% within PF_SELECT_CAT PF SELECT CAT	40.0%	44.4%	75.0%	50.0%
	3 591 and higher	Count	4	8	0	12
		Expected Count	4.8	4.3	2.9	12.0
		% within experiancat Experian cat	33.3%	66.7%	.0%	100.0%
		% within PF_SELECT_CAT PF SELECT CAT	20.0%	44.4%	.0%	24.0%
Total		Count	20	18	12	50
		Expected Count	20.0	18.0	12.0	50.0
		% within experiancat Experian cat	40.0%	36.0%	24.0%	100.0%
		% within PF_SELECT_CAT PF SELECT CAT	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.206[a]	4	.024
Likelihood Ratio	13.501	4	.009
Linear-by-Linear Association	.045	1	.832
N of Valid Cases	50		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is 2.88.

It is not clear whether this finding is indicative of a trend in the entrepreneurial population or whether the test for the Planning Fallacy bias was dysfunctional. The inconclusive nature of the results both within the Planning Fallacy bias and relative to the relationships that emerged with the other cognitive biases may suggest that respondents may have misinterpreted the questions. Alternatively, elements within the Planning Fallacy cognitive bias cause entrepreneurs to make markedly different risk based decisions than they would when influenced by the other cognitive biases under scrutiny.

The absolute cumulative mean of the Planning Fallacy questions was higher than the other cognitive biases (Table 4.1). It thus seems that entrepreneurs are influenced by the Planning Fallacy bias though the correlations that emerged both with the Delphi score, financial numeracy and other cognitive biases largely contradicted the pattern that had been established by the other cognitive biases in the study. . Regarding the other cognitive biases, rational decision makers seemed to make

better credit decisions and generally were more financially capable. The Planning Fallacy bias findings contradicted these trends and are deserving of further scrutiny though it is beyond the scope of the current research undertaking. A larger sample is required to re-examine this relationship at both the established and nascent entrepreneurial level.

Robust evidence of the Planning Fallacy bias within a loan applicant may serve as additional evidence to bolster an ambiguous Delphi credit score. This is particularly true at the nascent entrepreneurial level where credit scores, in the absence of rich credit histories, may often be uninformative. Knowledge that the applicant sets unrealistic targets may serve as a signal to a likely pattern of debt repayments. However, given the counterintuitive findings, this construct needs to be investigated further before the findings are confirmed.

4.9.3. Planning Fallacy and financial statement lending

Minor correlations emerged between the Planning Fallacy bias and both the entrepreneurs' usage of financial information and their level of overconfidence.

4.9.3.1. Level of Usage of Financial Information

The relationship is analysed at both the established and nascent entrepreneurial levels.

Established entrepreneurs

At an established entrepreneurial level, applicants who made more use of financial information were more influenced by the Planning Fallacy bias (-0.347). These more experienced entrepreneurs seem less likely to analyse their projections and results and are also surprisingly less likely to formulate unachievable financial or operational goals. This insight was contrary to Hypothesis 3 and opposes the findings of the other cognitive bias correlation analyses.

This anomaly may be understood in terms of the more experienced nature of the entrepreneur. When competing for a loan, the applicant is incentivized to advance the specific project to the loan officer as producing the required cashflows within an extremely efficient timeframe. Armed with the necessary financial reports, this task may seem more achievable. Financial information usage therefore becomes a reinforcing mechanism. As the entrepreneur attempts to set more difficult targets, financial information is examined or prepared in an attempt to justify the revisions. This explanation adds to the finding by von Blottnitz (2009) that SMME entrepreneurs are prone to manipulating their financial statements to reflect more favourable positions. However, it is doubtful whether these entrepreneurs would rely on manipulated and intentionally misleading information for internal decision making purposes.

This insight may be important to lending institutions. If the loan officer is able to establish that the applicant regularly reviews financial information, it may serve as a signal that the project deadlines and thresholds inherent in the business plan may be overly demanding. Since the evidence indicates that established entrepreneurs who regularly review financial information are also more irrational, further research is suggested.

Nascent entrepreneurs

Amongst nascent entrepreneurs, evidence of a relationship contrary to that of the established entrepreneurs emerged (0.178), though this correlation was well outside of meaningful significance levels. Nascent entrepreneurs less influenced by the Planning Fallacy bias seemed more likely to regularly use financial information. It is likely that financial information is limited to business plans and forecasts. Regular usage of these reports might suggest that achievable targets have been set. This insight is equally important to lending institutions – if the loan officer is able to ascertain that the entrepreneur makes use of financial information, it can serve as a signal that the business plan deadlines have been realistically set.

4.9.3.2. Overconfidence

The weak relationship at the overall sample population level (0.144) suggests that the more an applicant is inclined to taking risky decisions, the less overconfidence that applicant will exhibit. More interesting are the divergent correlation coefficients at the stratified sample level. This relationship manifests itself at the population level due to a much stronger correlation at the nascent entrepreneurial level (0.411). This correlation was found to be significant at the 0.05 level. A weaker relationship in the opposite direction was uncovered at the established entrepreneurial level (-0.257). This was inconsistent with the other cognitive biases investigated.

Nascent entrepreneurs

The evidence suggests that at a nascent entrepreneurial level, applicants who assume that unrealistic goals can be achieved with limited time and resources will not be overconfident in those beliefs. This finding is understandable. Having little experience, entrepreneurs would not be expected to factor all of the variables and possible pitfalls into a planned project. The corresponding low level of overconfidence amongst these excessively biased entrepreneurs is perhaps an admittance of their inexperience and their uncertainty behind the project plan.

Established entrepreneurs

Established entrepreneurs are more inclined to exhibit overconfidence when they have projected unrealistically achievable goals. This may be a projection to external parties of the ability of the entrepreneur to achieve more than is normally possible. Alternatively, this relationship may be an indication of the entrepreneur's past proven and impressive capabilities.

The relationship is a useful one from the perspective of a bank loan officer screening a loan application. Where Planning Fallacy is evident, this may be a signal to the loan officer that the entrepreneur, if nascent, will be open to revising the project plans. Established entrepreneurs do not appear to be as willing. In this instance,

evidence of past achievements in meeting project deadlines might be investigated to determine whether the Planning Fallacy bias is misplaced.

4.9.4. Planning Fallacy and Relationship Lending

No correlations were evident between the Planning Fallacy and willingness to post collateral. One might have expected nascent entrepreneurs influenced by the Planning Fallacy bias (particularly those without collateral) to be more willing to post collateral. It was anticipated that necessity based entrepreneurship is likely to lead to greater desperation to start trading. Alternatively, established entrepreneurs uninfluenced by the Planning Fallacy bias were expected to be less willing to post collateral. Their experiences with the inherent difficulties in forging a profitable enterprise were expected to temper their willingness to put their personal assets at risk. However, an analysis of the data yielded neither of these results.

4.9.5. Planning Fallacy findings implications

While the relationships that emerged indicate that the alternative sources of data generated can supplement the existing lending technologies within the framework of the Planning Fallacy bias, Hypotheses 1, 3 and 4 were not supported. Whilst there seemed to be counterintuitive support for SBCS and financial statement lending, behavioural finance insights seemed to offer no further certainty within the sphere of relationship lending. Evidence suggested that more irrational entrepreneurs were likely to yield better credit scores and the established entrepreneurs who made little use of financial information made more rational decisions. Financial statement based lending to nascent entrepreneurs may be supported based on the overconfidence findings.

Given the seemingly tenuous correlations, insights into the Planning Fallacy bias should be cautiously utilised by loan officers. Future research may further clarify the relationships, particularly those that seem at odds with the correlations that emerged in the other cognitive biases analyses.

4.10. Excessive Optimism

CHAPTER 4:
ANALYSIS OF THE RESULTS (Analysis of each of the cognitive biases and heuristics as a means to support the current bank lending technologies, findings of the hypotheses)
- Escalation of Commitment
- Lack of Counterfactual Thinking
- Illusions of Control
- Planning Fallacy
- Excessive Optimism
- Overconfidence
- Composite Score

4.10.1. Correlation insights

Table 4.13. Excessive Optimism – Spearman correlation coefficients

Excessive Optimism	**Small Business Credit Scoring**	**Financial Statement lending**			**Relationship lending**
	Delphi	Commercial Numeracy	Usage of Financial information	Overconfidence	Willingness to post collateral
Overall Sample	0.189	-0.149	-0.049	0.072	-0.175
Established entrepreneurs	0.102	-0.185	0.118	0.129	-0.265
Nascent Entrepreneurs	0.174	-0.126	-0.145	0.051	-0.101

Table 4.13 indicates that at an overall sample population level, no strong correlations emerged between the Excessive Optimism bias and any of the other constructs under investigation though there were minor correlations that warrant further discussion in certain cases. These will be analysed within the context of each of the existing lending technologies.

4.10.2. Excessive Optimism and Small Business Credit Scoring

The Spearman test revealed a minor correlation (0.189) between entrepreneurs influenced by the Excessive Optimism bias and their respective Delphi credit score. Given the abnormality of the Delphi score distribution, the correlation was not expected to be very strong. At the nascent (0.174) and established entrepreneurial level (0.102) this was found to be the case. In all instances, correlations were outside of meaningful significance levels.

Results of a Chi-Square test are included in Table 4.14. Though the sample size was not large enough to conclude on the significance of any relationships, it further describes the correlations presented in Table 4.13. Applicants who scored lower in the Delphi score were more likely to take riskier decisions.

Table 4.14. Excessive Optimism – Delphi Score Chi-Square Test

Crosstab

			Excessive Optimism CAT			
			1 -.2 and less	2 -.2 - .2	3 .2 and more	Total
experiancat Experian cat	1 584 and less	Count	8	5	0	13
		Expected Count	5.5	3.9	3.6	13.0
		% within experiancat Experian cat	61.5%	38.5%	.0%	100.0%
		% within EO_SELECT_CAT EO SELECT CAT	38.1%	33.3%	.0%	26.0%
	2 585 - 590	Count	8	6	11	25
		Expected Count	10.5	7.5	7.0	25.0
		% within experiancat Experian cat	32.0%	24.0%	44.0%	100.0%
		% within EO_SELECT_CAT EO SELECT CAT	38.1%	40.0%	78.6%	50.0%
	3 591 and higher	Count	5	4	3	12
		Expected Count	5.0	3.6	3.4	12.0
		% within experiancat Experian cat	41.7%	33.3%	25.0%	100.0%
		% within EO_SELECT_CAT EO SELECT CAT	23.8%	26.7%	21.4%	24.0%
Total		Count	21	15	14	50
		Expected Count	21.0	15.0	14.0	50.0
		% within experiancat Experian cat	42.0%	30.0%	28.0%	100.0%
		% within EO_SELECT_CAT EO SELECT CAT	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.396[a]	4	.078
Likelihood Ratio	11.595	4	.021
Linear-by-Linear Association	1.980	1	.159
N of Valid Cases	50		

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is 3.36.

The relationship that emerged was intuitively expected and was emphasized amongst applicants with lower Delphi credit score. Those applicants, who tend to take more irrational decisions within the Excessive Optimism construct, seemed to have worse credit histories. They will assume that all aspects of their business plan will eventuate in the best possible scenarios and will act according to this fallacy. This may result in the entrepreneurs overextending themselves with debt burdens that they cannot afford.

This information may be useful to lending officials who have received ambiguous credit scores for specific loan applicants. Where the score may not assist with the creditworthiness decision, knowledge that the applicants were likely to have forecast revenues in an overly optimistic light may give evidence of an inability to service debt repayments in the future if the targeted revenues cannot possibly be achieved.

4.10.3. Excessive Optimism and Financial Statement lending

Neither commercial numeracy skills, regularity of usage of financial information nor overconfidence had a clear correlation with the Excessive Optimism bias. This indicates that knowledge that an entrepreneur is influenced by the Excessive Optimism bias may not effectively clarify a loan officer's creditworthiness decision within a financial statement lending framework. This is surprising. Given the plausibility of excessive optimism leading to inflated forecasting, it seems that insights into the loan applicants tendency to be influenced by the Excessive Optimism bias would be advantageous.

An analysis of the data however indicated that applicants influenced by the Excessive Optimism bias were not less commercially numerate. The financial statements presented to the loan officer were not more or less likely to be inaccurate. In addition, excessively optimistic entrepreneurs were no more or less likely to be regular users of financial information. Whilst one might have argued that these entrepreneurs would be less inclined to dwell on disappointing results, it is possible that these entrepreneurs make more regular use of overly optimistic forecasts.

4.10.4. Excessive Optimism and Relationship based lending

The minor relationship that emerged between the Excessive Optimism bias and willingness to post collateral (-0.175) suggests that established entrepreneurs (-0.265) influenced by the Excessive Optimism bias are less willing to post collateral. Conversely, less biased entrepreneurs seemed more willing to offer collateral. The correlations were not found to be significant within meaningful significance limits. This relationship does however indicate that the more irrational decision makers within the Excessive Optimism construct were not as prepared to risk their own capital.

This insight might have been particularly useful to lending institutions if it were shown to be evident within meaningful significance levels. If it can be ascertained that the more established entrepreneur is willing to post collateral, this may in turn indicate that the projections that have been presented as part of the business plan have not been overly optimistic. This in turn reinforces the reliance that can be placed on the achievability of the project. Given this extra assurance, lending institutions might be placed in a situation where they can reduce collateral demands in certain instances.

4.10.5. Excessive Optimism findings implications

The relationships that emerged indicate that the alternative sources of data generated can supplement the existing lending technologies within the framework of the Excessive Optimism bias though to a more limited degree. Tenuous support for Hypotheses 1 and 4 emerged. The Spearman and Chi-Square tests indicated that behavioural finance insights can support the creditworthiness decision when the primary lending technology utilised is SBCS. The data analysis also indicated that alternative forms of creditworthiness information may also support relationship based lending where established entrepreneurs are applying for finance. However, no evidence emerged suggesting that these alternative sources of information would further clarify a financial statement based lending decision.

This SBSC insight seemed to be particularly useful at an established entrepreneurial level. While more informative credit scores are available in the instance that an

entrepreneur has a richer credit history, further decision making insights may reduce any remaining creditworthiness uncertainty. Nascent entrepreneurs seemed to have more limited credit histories and less informative credit scores exacerbating the uncertainty surrounding the loan decision and the importance of alternative forms of creditworthiness information.

With regard to Relationship Based Lending, the data analysis suggested that alternative forms of creditworthiness information were relevant within an established entrepreneurial context. This insight coincides with the applicability of the lending technology largely to established entrepreneurs since they are more likely to have a relationship with the loan officer.

4.11. Overconfidence

CHAPTER 4:
ANALYSIS OF THE RESULTS (Analysis of each of the cognitive biases and heuristics as a means to support the current bank lending technologies, findings of the hypotheses)
- Escalation of Commitment
- Lack of Counterfactual Thinking
- Illusions of Control
- Planning Fallacy
- Excessive Optimism
- Overconfidence
- Composite Score

4.11.1. Correlation insights

Table 4.15. Overconfidence – Spearman correlation coefficients

Cognitive Risk Propensity	**Small Business Credit Scoring**	**Financial Statement lending**		**Relationship lending**
(Overconfidence)	Delphi	Commercial Numeracy	Usage of Financial information	Willingness to post collateral
Overall Sample	0.070	0.064	0.423	0.226
Established entrepreneurs	0.578	0.105	0.418	0.098
Nascent Entrepreneurs	-0.313	0.057	0.355	-0.502

Table 4.15 indicates that at an overall sample population level, no strong correlations emerged between the Overconfidence bias and any of the other constructs under investigation at the overall sample level, including those within Financial Statement lending. Minor, moderate and strong correlations that emerged at the stratified sample levels warrant further discussion. These will be analysed within the context of each of the existing lending technologies.

4.11.2. Overconfidence and Small Business Credit Scoring

Amongst established entrepreneurs, evidence strongly suggests that applicants who were more overconfident had better credit histories (0.578). This correlation was significant within the 0.01 level. Given that overconfident entrepreneurs are less likely to take advice from others (Gardner and Berry; 1995), this relationship may suggest that these applicants are less likely to be influenced by third parties to enter into risky ventures. Conversely, one might posit, that less overconfident, more established applicants enter into more risky credit transactions without consulting with experts assuming that they will be able to make the unaffordable repayments. Since many applicants in the population have scant credit histories, it would seem that most of these established entrepreneurs did not enter into risky credit agreements, countering this second alternative. Amongst nascent entrepreneurs, a moderate relationship emerged in the hypothesised direction. This indicates that nascent entrepreneurs that exhibit symptoms of overconfidence are more likely to have poor credit histories. These entrepreneurs, convinced of their own decision making abilities, may be susceptible to acting alone and while still inexperienced.

Both the correlations with the SBCS and the contrasting relationships that emerged between the two entrepreneurial samples may offer useful insights into creditworthiness decisions. Assessing for overconfidence alone might serve as a more sophisticated mechanism to determine whether the loan applicant was likely to cooperate with the lending institution. Prior to the evidence that emerged, one might have assumed that this would be an indication of progress in the process of reducing the uncertainty present in many loan applications decisions. The evidence, while

supporting the overarching hypothesis that behavioural finance insights are useful in the creditworthiness decision, further suggests that markedly different signals must be interpreted depending on whether the entrepreneur is considered to be nascent or more established.

Where the presence of overconfidence in an established applicant might be viewed by a lending officer as an indicator of riskiness, this evidence suggests that the converse may be true. While they may be reluctant to take advice from the loan officer, overconfident applicants seem to be more likely to make the required debt repayment. Nascent entrepreneurs however seem to be more risky prospects where evidence of overconfidence is found.

In both instances, where an applicant with a limited credit history might have an uninformative credit score, information of this nature might afford the lending institution further clarity.

4.11.3. Overconfidence and Financial Statement lending

The relationship between overconfidence and regularity of usage of financial information (0.423) emerged as marginally more evident amongst established (0.418) than nascent entrepreneurs (0.355). Correlations at the overall and established levels were significant within 0.01 and 0.05 levels respectively. Initially, one might have thought that overconfident entrepreneurs made less usage of financial information since they believe that they already know the facts. In both cases however, evidence of the opposite relationship emerged. More regular users of financial information were more likely to be overconfident. Alternative theories will be explored as to the direction of causation.

Regularity of usage of financial information makes the decision maker overconfident

As the entrepreneur consistently refers to financial information, a sense of confidence is gained in the decision making process. It is likely that established entrepreneurs would be more affected by this relationship as they have greater

exposure to this causal process. In fact, the correlation was found to be stronger amongst established entrepreneurs.

Overconfident decision makers regularly review financial information to support their decisions

The entrepreneur, having previously decided on a course of action, will look to financial information both prior to and after the decision to justify the decision. This causal direction is indicative of the Escalation of Commitment bias. However, the opposite relationship emerged amongst established entrepreneurs who seemed to be less influenced by the Escalation of Commitment bias.

Evidence therefore seems to suggest that more regular usage of financial information causes one to exhibit greater signs of overconfidence.

4.11.3.1 Overconfident applicants and financial information

Currently, lending institutions are unlikely to grant loans to organizations that do not provide the mandated financial information. When considering financial information requirements, lending institutions should differentiate between those entrepreneurs who are unwilling to disclose accurate information and those who are unable (Table 4.16).

Table 4.16 Willingness and Ability to provide financial information

Provision of financial information	**Able**	**Unable**
Willing	(A) Least uncertainty	(B) Uncertain
Unwilling	(C) Uncertain	(D) Most uncertainty

Willing and able applicants (A) will generally be methodically evaluated for loans. Unwilling and unable applicants (D) will generally not be evaluated for loans. The possibility that applicants B and C may not be evaluated due to the difficulty of

providing financial information is one of the factors underpinning the SMME credit mismatch. Lending institutions might further analyse entrepreneurs that can provide financial information but are unwilling to (C) as well as those who are unable to, but would if they were able (B).

It is suggested that overconfident entrepreneurs fall into the (C) quadrant. Overconfident individuals are less prone to ask for advice, as they value their own judgements over those of the loan officers. It is suggested that they will therefore be less forthcoming with all of the required financial information. Evidence from the correlation analyses indicates that entrepreneurs that were more influenced by the overconfidence bias were more likely to make use of financial information. In addition, more overconfident entrepreneurs seemed to be generally less susceptible to influence by other cognitive biases.

Quadrant B

Nascent entrepreneurs were more overconfident on average than established entrepreneurs and also professed to make slightly more regular use of financial information (Table 4.17). In addition, the evidence suggests that nascent entrepreneurs with commercial numeracy skills were more likely to make rational decisions (Table 4.18). If it is ascertained that nascent entrepreneurs have an understanding of the financial concepts but lack the ability to present the information regularly, the loan officer might give pause to further analyse whether the current presentation constraints can be easily overcome. Once a loan has been granted, these entrepreneurs may prioritize the sourcing of the necessary skills and resources to generate financial information.

Table 4.17 Overconfidence and Financial information usage

	Overconfidence	Financial usage
	(-1 to +1)	(0 - 1)
Overall sample	0.288	0.813
More established	0.149	0.775
Nascent	0.427	0.852

The drawback to nascent entrepreneurial willingness to provide financial information is that the information might be misleading when presented. Where the entrepreneur is overconfident concerning the firm's prospects of success, and a financial institution is less exuberant, an increased incentive exists to misreport. If not done overtly, the entrepreneur might unprofessionally compile all the positive information that resources allow in order to portray a more positive set of results. Nascent entrepreneurs might also be less aware of the regulatory prohibitions and penalties concerning financial misrepresentation. Laux and Stocken (2010) posited that the heightened risk of deviant reporting based litigation might in fact exacerbate the level of managerial misreporting.

Concerning nascent entrepreneurs, loan officers will be less concerned that their applicants are willingly withholding financial information. Rather, they are unable to present the required reports due to lack of skills or resources. However, should that information be presented, the loan officers must be cognisant of the entrepreneur's incentive to (willingly or unwillingly) portray misleadingly positive information.

Quadrant C

Individuals influenced by the overconfidence bias are less willing to value the insights of others. The lending institution might anticipate that the entrepreneurs who do not willingly share financial information are overconfident of their own abilities and consequently do not need the opinions or insights of employees of the bank. Overconfidence might therefore be considered a risky trait from the perspective of the lending institution. In fact, overconfident entrepreneurs seem to make more use of financial information when making decisions. Their overconfidence might in fact be a demonstration of self efficacy – they are confident of their own decisions and do not wish to jeopardise the decision making process through inclusion of those they perceive to be less experienced and competent in their specific fields. This, along with their tendency to make more rational decisions, might actually serve as a creditworthiness signal.

Alternatively, one needs to consider the established entrepreneur that is applying for needed finance and has no choice but to supply the requested information to qualify for the loan. Not being in a position to withhold information, this entrepreneur has an

incentive to provide only the most positive information. Laux and Stocken (2010) acknowledge the probability that the entrepreneur possesses private information and withholds unfavourable news. Schrand and Zechman (2011) found that overconfident executives were more likely to initially overstate earning (optimistically rather than intentionally) causing a greater likelihood of ultimately intentionally misstating results.

The loan officer must in the case of established entrepreneurs assess whether all information that has been requested is provided. Where the established entrepreneur exhibits the influence of overconfidence, the difficulty will be in determining whether only selective information that may negatively affect the application has been withheld or whether it is a reluctance stemming from an innate belief that the enough information has been presented and the business is not in need of additional advice or opinions.

In both these instances, evidence of influence by cognitive biases may serve as an indicator that the loan applicant is not necessarily a credit risk based only on an inability or unwillingness to provide all of the required financial reports.

This relationship may be useful to lending institutions. Where overconfidence manifests in the applicant's decision not to include third parties in the management decisions of the business, the relationship indicates that the applicants may in fact possess and make use of financial information. The applicants can then be strongly encouraged to share this information as part of the approval process.

4.11.4. Overconfidence and Relationship based lending

Evidence suggests that overconfident nascent entrepreneurs are more likely to be willing to post collateral (0.502 correlation coefficient). The correlation was found to be significant within the 0.05 level. These entrepreneurs, overly sure of their prospects for success, may be willing to demonstrate their conviction through their willingness to post collateral. Nascent entrepreneurs are less likely to actually possess collateral – they are not therefore at risk of an actual personal loss. This

relationship did not emerge amongst established entrepreneurs where the potential loss may have been more real.

Where overconfidence may have been perceived as a risk exacerbating factor, loan officers might be wary of entrepreneurs overly willing to post collateral. This variable should be viewed in conjunction with several of the other insights that have emerged including evidence of propensity to risk taking through the various cognitive biases.

4.11.5. Overconfidence findings implications

Overconfidence is not linked to risk propensity and is therefore analysed separately from the other cognitive biases and the aggregation thereof. The relationships that emerged indicate that this alternative source of information can supplement the existing lending technologies. Evidence of the converse of Hypothesis 2 was found. Financial institutions that rely primarily on financial statement lending may nevertheless gain further certainty on an individual's creditworthiness by having insight into evidence of the Overconfidence bias. Overconfidence may be viewed in a more contemplative light in that it suggests that entrepreneurs who exhibit the bias are more likely to be informed of the venture's financial situation and understand the information. This relationship may suggest that the entrepreneur will be non cooperative and conceal known irregularities. Alternatively, the loan officer may also determine that the entrepreneur is well informed and signs of non cooperation or reticence are not necessarily signals of credit risk. Prior relationships with the applicant may assist in clarifying the level of cognitive influence that emerges.

Insights into the applicant's levels of overconfidence seemed to offer strong support for SBCS at the established entrepreneurial level and relationship based lending at the nascent level. These insights seem less pragmatically useful since relationship lending will rarely apply at the nascent level and SBCS is seen to operate effectively at an established entrepreneurial level. Nevertheless, additional clarity is possible where SBCS scores are not definitive, which is often the case.

4.12. CRP score

CHAPTER 4:
ANALYSIS OF THE RESULTS (Analysis of each of the cognitive biases and heuristics as a means to support the current bank lending technologies, findings of the hypotheses)
- Escalation of Commitment
- Lack of Counterfactual Thinking
- Illusions of Control
- Planning Fallacy
- Excessive Optimism
- Overconfidence
- Composite Score

4.12.1. A combination of cognitive biases

Various relationships of differing strengths have emerged that indicate the suitability of individual cognitive biases to the creditworthiness decision. Depending on the predominant lending technology and the stage of entrepreneurship, knowledge of the level of influence that certain cognitive biases have on the applicant's decision making process may be more informative than others. Ideally, algorithms of the optimal combinations of cognitive biases would be developed for these scenarios. Many additional variables specific to the sector, risk profile and lending policies of the financial institution would need to be considered. This is beyond the scope of the current study. The aim is rather to propose and then demonstrate that such combinations would be useful. An aggregated score encompassing the four cognitive biases analysed thus far is presented below.

4.12.2. Deriving the CRP score

Two questions from each of the cognitive bias vignette constructs are included in an overall cognitive bias risk propensity (CRP) score. These questions are EC3, EC5,

EO3, EO4, IC4, IC5, PF1 and PF2. The questions were then combined in a mathematical formula:

*{[((((EC3+EC5+EO3+EO4+IC4+IC5+PF1+PF2)-8)*2) / 32) – 1] x -1}*

and a score between -1 and 1 was derived. A higher score signified an entrepreneur who was generally less influenced by the various cognitive biases. This overall score was then correlated with the various other constructs in the research study (Table 4.3; 4.4 and 4.5). In addition, a chi-test was performed between the CRP score and the Delphi credit score for the overall sample population (Table 4.19), as well as established entrepreneurs and nascent entrepreneurs (Table 4.20).

4.12.3. Correlation insights

At an overall sample population level, no strong correlations emerged between the CRP composite score and any of the other constructs under investigation though there were minor correlations and a moderate correlation that warrant further discussion in certain cases. These will be analysed within the context of each of the existing lending technologies.

Table 4.18. Cognitive Risk Propensity – Spearman correlation coefficients

Cognitive Risk Propensity	**Small Business Credit Scoring**	**Financial Statement lending**			**Relationship lending**
(CRP Score)	Delphi	Commercial Numeracy	Usage of Financial information	Overconfidence	Willingness to post collateral
Overall Sample	0.200	0.110	0.060	0.240	0.042
Established entrepreneurs	0.340	-0.059	0.009	0.214	-0.104
Nascent Entrepreneurs	0.015	0.367	0.130	0.244	0.193

4.12.4. The CRP composite score and Small Business Credit Scoring

At an overall sample population level (Table 4.18), a minor correlation was found between the CRP score and the Delphi score (0.200). This relationship was largely

as a result of responses from the established entrepreneurial level (0.340) and due to the positive correlations demonstrated between EC, IC, EO and the Delphi score. The correlation was not within the 0.05 significance level however it was within meaningful enough bounds (0.121) to suggest pragmatically useful insights.

It is evident from this test at the overall sample level that those entrepreneurs who had lower Delphi score tended to be more influenced by one or several of the cognitive biases forming part of the overall CRP score. Amongst those entrepreneurs with a higher Delphi score, the relationship at the overall sample level is less evident. When the nascent entrepreneurs are stratified out, both the Chi test and Spearman test reflect a moderate relationship between the CRP score and Delphi score.

Table 4.19. Sample population CRP Score – Delphi Score Chi-Square Test

experiancat Experian cat * CRP_TAILOLRED_Cat CRP TAILORED cat Crosstabulation

			CRP_TAILOLRED_Cat CRP TAILORED cat			
			1 -.2 and less	2 -.2 - .2	3 .2 and more	Total
experiancat Experian cat	1 584 and less	Count	8	4	1	13
		Expected Count	4.2	6.0	2.9	13.0
		% within experiancat Experian cat	61.5%	30.8%	7.7%	100.0%
		% within CRP_TAILOLRED_Cat CRP TAILORED	50.0%	17.4%	9.1%	26.0%
	2 585 - 590	Count	5	13	7	25
		Expected Count	8.0	11.5	5.5	25.0
		% within experiancat Experian cat	20.0%	52.0%	28.0%	100.0%
		% within CRP_TAILOLRED_Cat CRP TAILORED	31.3%	56.5%	63.6%	50.0%
	3 591 and higher	Count	3	6	3	12
		Expected Count	3.8	5.5	2.6	12.0
		% within experiancat Experian cat	25.0%	50.0%	25.0%	100.0%
		% within CRP_TAILOLRED_Cat CRP TAILORED	18.8%	26.1%	27.3%	24.0%
Total		Count	16	23	11	50
		Expected Count	16.0	23.0	11.0	50.0
		% within experiancat Experian cat	32.0%	46.0%	22.0%	100.0%
		% within CRP_TAILOLRED_Cat CRP TAILORED	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.414[a]	4	.116
Likelihood Ratio	7.294	4	.121
Linear-by-Linear Association	3.524	1	.060
N of Valid Cases	50		

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is 2.64.

Table 4.20 demonstrates that at this established entrepreneurial level, the relationship is more apparent across the range of score groupings. This may be due to the richer credit histories expected within more experienced entrepreneurs that contribute more to the Delphi credit score. The relationship that emerged suggests

that more rational decision makers have higher credit scores (possibly as a result of better credit decisions in the past) and supports Hypothesis 1. This is driven by a more evident correlation within the group of established entrepreneurs and less so by the nascent entrepreneurs.

Table 4.20 Established and nascent CRP Score – Delphi Score Chi-Square Test

experiancat Experian cat * CRP_TAILOLRED_Cat CRP TAILORED cat Crosstabulation

				CRP_TAILOLRED_Cat CRP TAILORED cat		
newIP6 Status				1 - .2 and less	2 - .2 - .2	3 .2 and more
1 Established	experiancat Experian cat	1 584 and less	Count	4	3	0
			Expected Count	2.2	3.1	1.7
			% within experiancat Experian cat	57.1%	42.9%	.0%
			% within CRP_TAILOLRED_Cat CRP TAILORED cat	50.0%	27.3%	.0%
		2 585 - 590	Count	2	5	4
			Expected Count	3.5	4.8	2.6
			% within experiancat Experian cat	18.2%	45.5%	36.4%
			% within CRP_TAILOLRED_Cat CRP TAILORED cat	25.0%	45.5%	66.7%
		3 591 and higher	Count	2	3	2
			Expected Count	2.2	3.1	1.7
			% within experiancat Experian cat	28.6%	42.9%	28.6%
			% within CRP_TAILOLRED_Cat CRP TAILORED cat	25.0%	27.3%	33.3%
	Total		Count	8	11	6
			Expected Count	8.0	11.0	6.0
			% within experiancat Experian cat	32.0%	44.0%	24.0%
			% within CRP_TAILOLRED_Cat CRP TAILORED cat	100.0%	100.0%	100.0%
2 Nascent	experiancat Experian cat	1 584 and less	Count	4	1	1
			Expected Count	1.9	2.9	1.2
			% within experiancat Experian cat	66.7%	16.7%	16.7%
			% within CRP_TAILOLRED_Cat CRP TAILORED cat	50.0%	8.3%	20.0%
		2 585 - 590	Count	3	8	3
			Expected Count	4.5	6.7	2.8
			% within experiancat Experian cat	21.4%	57.1%	21.4%
			% within CRP_TAILOLRED_Cat CRP TAILORED cat	37.5%	66.7%	60.0%
		3 591 and higher	Count	1	3	1
			Expected Count	1.6	2.4	1.0
			% within experiancat Experian cat	20.0%	60.0%	20.0%
			% within CRP_TAILOLRED_Cat CRP TAILORED cat	12.5%	25.0%	20.0%
	Total		Count	8	12	5
			Expected Count	8.0	12.0	5.0
			% within experiancat Experian cat	32.0%	48.0%	20.0%
			% within CRP_TAILOLRED_Cat CRP TAILORED cat	100.0%	100.0%	100.0%

Chi-Square Tests

new IP6 Status		Value	df	Asymp. Sig. (2-sided)
1 Established	Pearson Chi-Square	4.516[a]	4	.341
	Likelihood Ratio	5.955	4	.203
	Linear-by-Linear Association	1.982	1	.159
	N of Valid Cases	25		
2 Nascent	Pearson Chi-Square	4.636[b]	4	.327
	Likelihood Ratio	4.588	4	.332
	Linear-by-Linear Association	1.437	1	.231
	N of Valid Cases	25		

a. 9 cells (100.0%) have expected count less than 5. The minimum expected count is 1.68.

b. 8 cells (88.9%) have expected count less than 5. The minimum expected count is 1.00.

4.12.5. The CRP composite score and Financial Statement lending

A minor correlation emerged between commercial numeracy and the CRP (rational decision making) score – the more rational decision makers seemed to have a better grasp of basic financial concepts. In addition, commercial numeracy and regularity of usage of financial information were both noticeably correlated with overconfidence at the overall sample level and at the more established and nascent entrepreneurial levels.

Usage of financial information

Entrepreneurs that were influenced by a composite of several cognitive biases linked to a higher risk propensity were no more or less likely to be regular users of financial information. We might speculate that rational decision makers are likely to utilize financial information to ensure that as little uncertainty as is reasonably possible exists. Conversely, irrational decision makers may utilize financial information to substantiate their unreasonable proposal. Table 4.21 demonstrates that minor correlations were found and these were often inconsistent when comparing the cognitive biases. This suggests that while one may infer financial information usage based on decision making behaviour, this should be limited to individual biases.

Table 4.21. Spearman's Correlation coefficients - Cognitive Risk Propensity and Financial Statement lending

Spearman's Correlations	Usage of financial information			Commercial numeracy skills		
	More established	Nascent	Overall	More established	Nascent	Overall
Escalation of Commitment	0.243	0.170	0.150	-0.056	0.189	0.052
Illusions of Control	0.017	0.144	0.049	0.054	0.530	0.267
Planning Fallacy	-0.347	0.178	-0.022	0.005	0.118	0.056
Excessive Optimism	0.118	-0.145	-0.049	-0.185	-0.126	-0.149
CRP (overall Cognitive Risk Propensity)	0.009	0.130	0.060	-0.059	0.367	0.110

Commercial numeracy

Minor evidence of a relationship emerged between the entrepreneur's CRP score and level of commercial numeracy at the overall sample and established entrepreneurial level. Evidence from Table 4.18 suggested a moderate correlation at a nascent entrepreneurial level (0.367) between the CRP score and the entrepreneur's level of commercial numeracy. The correlation was slightly outside of the 0.05 significance levels. This indicates that more rational decision makers seemed to have a better grasp of basic financial concepts. This relationship is mainly underpinned by those entrepreneurs who were influenced by the IC bias, where a moderate relationship was demonstrated.

Based on the data analysis, behavioural finance insights may better support financial statement lending technologies at the nascent entrepreneurial level. In addition, stronger relationships emerged when analysing individual biases than when consolidating biases into a composite score. However, lack of financial skills does indicate that the nascent entrepreneur is influenced by cognitive biases associated with higher risk propensities. This insight is useful to loan officers when assessing creditworthiness.

4.12.6. CRP score and Relationship based lending

Little evidence of a relationship emerged between the entrepreneur's CRP score and their willingness to offer collateral at the overall sample and established entrepreneurial level. Evidence from Table 4.18 suggested a minor correlation (0.193) at a nascent entrepreneurial level giving a level of support to Hypothesis 4 though the correlation was outside of meaningful levels of significance. The relationship may indicate that those entrepreneurs who are more influenced by the various cognitive biases will be more willing to offer collateral. The correlation emerges primarily due to the presence of the Escalation of Commitment bias, which yielded a minor correlation at a reasonable level of significance (0.170).

Nascent entrepreneurs' willingness to post collateral may be linked to their propensity to rational decision making. More risk averse decision makers seem to be less willing. When comparing the *willingness to post collateral variable* amongst those entrepreneurs that had collateral (*Willing and able*) and those that didn't (*Willing but Unable*), it emerged that the entrepreneurs that were more influenced by cognitive biases were more likely to offer collateral, particularly if they didn't have any to offer (*Willing but Unable*). Those that did have collateral and were willing to offer it (*Willing and Able*) were less influenced by cognitive biases.

Willing but Unable

These applicants may be more willing to take risks since they are not *really* going to suffer financially for any errors that are made. A moral hazard question therefore arises. This willingness, coupled with the likelihood of a poor Delphi or CRP score serves as a signal to the bank officer of a creditworthiness issue that may augment previous knowledge and make the decision to decline the loan more certain.

Alternatively, they may be more willing to take risks given their desperation to finance their businesses and commence trading i.e. because they don't have the collateral (assets), they are willing to take greater risks to earn the assets. In fact, when analysing the willingness of nascent entrepreneurs to post collateral, to their CRP scores, evidence suggested that nascent entrepreneurs who are more

influenced by cognitive biases are more willing to take risky decisions in order to secure borrowings than were established entrepreneurs.

Willing and Able

The evidence suggests that applicants who have collateral and are willing to post it took less risky business decisions. This is an added vindication to the current practice of granting loans on the basis of collateral (the 'lazy bank' syndrome). The posting of collateral is not only a means to reduce the risk of default, it is in fact a signal of the decision making character of the entrepreneur. This insight might afford the lending institution the ability to reduce its collateral demands. If the lending institution is able to ascertain that the entrepreneur is a rational decision maker, the reduced uncertainty may strengthen the relationship. This in turn might negate the need for high levels of collateral.

This relationship has limited application at a financial institution level. Relationship based lending presupposes a familiarity between the lender and the borrower. Within the nascent entrepreneurial context, it is likely that the lender and borrower have no prior relationship. Relationship lending is thus not the suggested lending technology and alternate forms of creditworthiness information may be superfluous. However, knowledge of the loan applicant's commitment to a project and predisposition to risk taking even within this context may prove to be a useful supplement to the principal lending technologies. Within the financial statement lending context, the data analysis revealed that those nascent entrepreneurial applicants that make more usage of financial information seem to be slightly more inclined to post collateral. Perhaps now that the entrepreneur has a greater potential loss, more motivation to closely monitor the financial results is present. However, this relationship was not apparent at the established entrepreneurial level.

An aggregate score encompassing biases that do not seem to have a relationship with the one's willingness to post collateral may not be optimal. Rather, focus should be limited to the specific biases that seem to have predictive ability.

4.12.7. Aggregated cognitive bias (CRP score) findings summary

Minor substantiation of Hypothesis 1, Hypothesis 3 and Hypothesis 5 emerged. The potential for behavioural insights to support the SBCS creditworthiness process (Hypothesis 1) emerged primarily at the established entrepreneurial level, while financial statement lending (Hypothesis 3) and relationship based lending (Hypothesis 5) seemed to have more potential at the nascent entrepreneurial level. The contradictory position to hypothesis 2 emerged at the overall and stratified sample levels.

Relationships between the various constructs making up the CRP score were more noticeable than at the aggregated level. The relationships seem to dilute rather than strengthen when the cognitive biases are grouped together into a single score.

4.13. Summary of findings

4.13.1. Introduction

Several relationships have been identified that lend support to the hypotheses. A summary of the findings is presented in Table 4.22. The summary indicates that Behavioural Finance insights support the major lending technologies. In several cases, the relationships that emerged were minor. The Escalation of Commitment, Illusion of Control and Overconfidence biases seemed to yield the most meaningful relationships. Within each of the most prevalent lending technologies, a meaningful correlation with a Behavioural Finance insight was revealed.

Table 4.22 Summary of Findings by Cognitive Bias

	Small Business Credit Scoring		Financial Statement Lending		Relationship Based Lending	
	Established	Nascent	Established	Nascent	Established	Nascent
Escalation of Commitment	✓	☐	⊖	⊖	☐	⊖
Planning Fallacy	✕	☐	✕	⊖	☐	☐
Illusions of Control	⊖	☐	☐	✓	☐	☐
Excessive Optimism	☐	☐	☐	☐	⊖	☐
Overconfidence[1]	✓	✕	✕	✕	☐	✓

✓ Moderate to strong relationships emerged supporting the overall premise
⊖ Minor relationships emerged supporting the overall premise
✕ Relationships emerged that support the overall premise but in an unexpected manner
☐ No evidence was found to confirm or contradict the hypothesis

[1]Overconfidence is not indicative of predisposition to risk taking. However, several meaningful relationships emerged that may assist the lending decision process. Overconfidence does not form part of the CRP score.

The hypothesis findings can thus be summarised as follows (Table 4.23)

Table 4.23 Summary of Hypothesis findings

Summary of Hypothesis findings

	Overall sample	Established entrepreneurs	Nascent entrepreneurs
Hypothesis 1	✓	✓	☐
Hypothesis 2	✕	✕	✕
Hypothesis 3	☐	☐	✓
Hypothesis 4	☐	☐	☐
Hypothesis 5	☐	☐	✓

✓ Evidence for the hypothesis was found
✕ Evidence contradicting the hypothesis was found
☐ No evidence was found to confirm or contradict the hypothesis

4.13.2. Hypothesis 1

The cognitive risk propensity (CRP score) will be positively correlated with the credit agency (Delphi score) rating

At the overall population level, support for this hypothesis was found. This was most evident within the Escalation of Commitment bias. The Chi-Square tests indicated similar findings. Given the sample sizes and the abnormal Delphi Score distribution, no statistical significance can be read into the results. Positive correlations were found with regard to the Escalation of Commitment and Illusion of Control biases as well as the CRP score. Evidence therefore suggests that amongst the applicant sample group as a whole, those entrepreneurs who were more influenced by cognitive biases, were more likely to have poorer Delphi credit scores.

Amongst the established entrepreneurs, evidence in support of this hypothesis was more evident for all of the cognitive biases other than the Planning Fallacy bias. This translated into a stronger correlation at the overall CRP level. At the nascent level, though all of the correlations were absent or weak, the overall CRP positive relationship remained.

Based on these findings, it seems that behavioural finance insights can offer useful support to the creditworthiness assessment decision process when the associated lending tool is SBCS.

4.13.3. Hypothesis 2

Overconfidence will be negatively correlated with financial sophistication

The contradictory relationship was found to be true at the overall sample and stratified sample levels. Evidence therefore suggests that amongst the applicant sample group as a whole, those entrepreneurs who were more influenced by the overconfidence bias, were more likely to regularly make use of financial information. No informative correlations emerged between overconfidence and commercial numeracy.

This relationship suggests that behavioural finance insights can offer useful support to the creditworthiness assessment decision process when the associated lending tool is Financial Statement lending, though in a manner that may have been unexpected.

4.13.4. Hypothesis 3

Financial sophistication will be positively correlated with cognitive risk propensity (more irrational decision making)

At the overall sample level and regarding the level of usage of financial information, negligible support was found for this hypothesis. In addition, at both the more established and nascent entrepreneurial levels, little support was found. Evidence suggests therefore that the level of usage of financial information is not dependent on or a driver for the extent to which entrepreneurs are influenced by the cognitive biases linked to ones predisposition to risk taking. As noted, the lack of normality of the data, and the possibility that respondents overestimated the extent to which they utilize financial information may have contributed to the lack of support found.

Regarding the entrepreneur's commercial numeracy skills, at the overall sample level, little support was found for the hypothesis. At the nascent entrepreneurial level, the Spearman analysis revealed a relationship between the applicants' CRP score and their commercial numeracy skills. This was primarily driven by the Illusion of Control bias and suggests that at the nascent entrepreneurial level, those applicants who were more influenced by risk propensity indicative cognitive biases (particularly the Illusion of Control bias) were less likely to have strong commercial numeracy skills.

This relationship suggests that behavioural finance insights can offer limited support to the creditworthiness assessment decision process when the associated lending tool is Financial Statement lending.

4.13.5. Hypothesis 4

Collateral dread will be positively correlated with cognitive risk propensity (more rational decision making)

At the overall sample level and established entrepreneurial level, negligible support was found for this hypothesis. The findings were marginally stronger amongst nascent entrepreneurs though at relatively weak levels of significance. This suggests that entrepreneurs more influenced by the Escalation of Commitment bias may be more inclined to offer collateral on a loan. At the established entrepreneurial levels, the relationship was inconclusive.

The findings suggest that behavioural finance insights can assist the creditworthiness assessment decision process though not as regards insights into predisposition to risk taking. The relationship that emerged with the Overconfidence bias suggests that creditworthiness assessment support is likely to be limited to nascent entrepreneurs.

4.13.6. Hypothesis 5

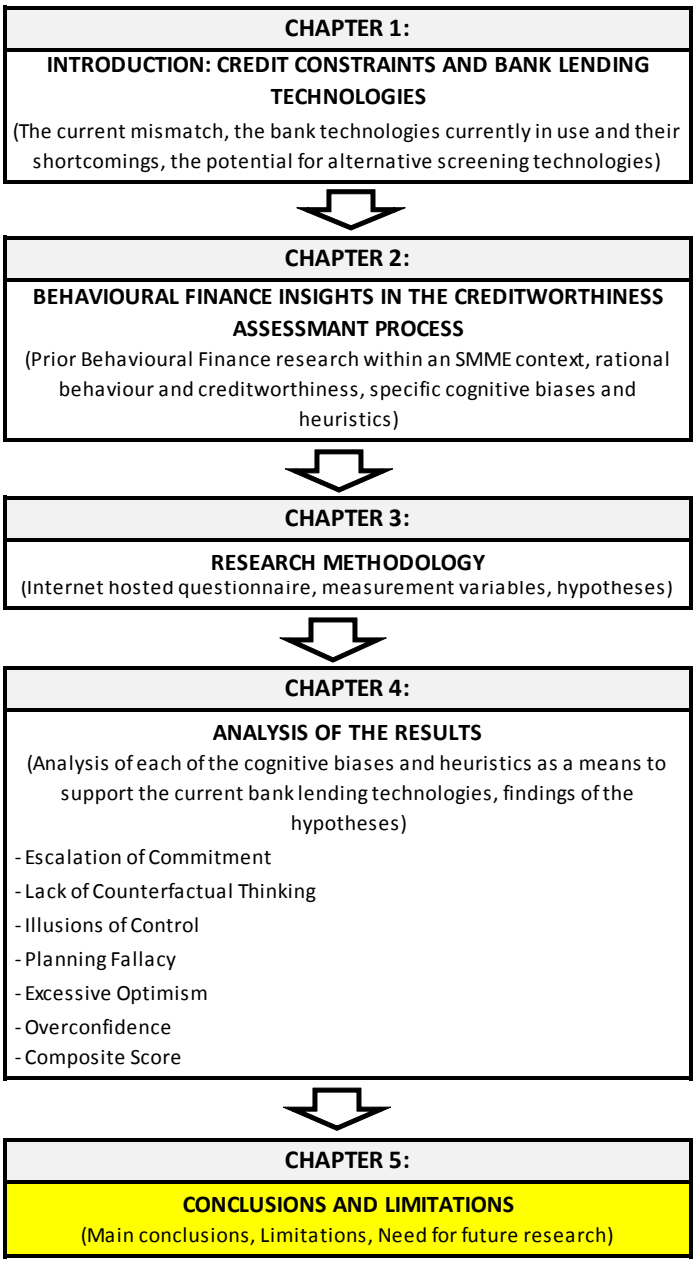
Collateral dread will be negatively correlated with financial sophistication

At the overall sample level, negligible support was found for this hypothesis. Little support was found both when analysing the respondent's level of usage of financial information and commercial numeracy skills.

Regarding nascent entrepreneurs, minor support for the hypothesised relationship was evident when correlating the entrepreneur's usage of financial information with their willingness to post collateral. Supporting the hypothesis, those entrepreneurs who were more willing to post collateral tended to make more regular use of financial information. No relationship was found between the nascent entrepreneur's willingness to post collateral and their commercial numeracy skills.

It seems that little assistance to the creditworthiness assessment decision process is possible in this regard since nascent entrepreneurs are not likely to be screened within a relationship based lending context.

Chapter 5 – Discussion and Conclusions



5.1 Chapter introduction

The constraints to SMME lending and borrowing as well as the failing of the most widely utilized bank lending technologies to address these constraints are briefly summarized. The usefulness of Behavioural Finance and other selected alternative forms of creditworthiness information as a supplement to each of the most widely utilized bank lending technologies is affirmed as each of the findings is presented. It

is suggested that Behavioural Finance insight are relevant to the creditworthiness assessment process and relatively easy to accumulate. Finally, limitations to the study and suggestions for future research within the areas of creditworthiness and Behavioural Finance are detailed.

5.2. An alternative stance on SMME finance constraints

The development of the SMME sector is critical to general economic development in South Africa and small business funding issues have been extensively explored as one of the most significant constraints to progress in this area. Opinions vary as to whether the lack of finance available or lack of demand has been the underlying cause behind the lending mismatch. Financial institutions allege that creditworthy firms are not taking up the significant amounts of loan capital that have been made available, while cash constrained firms assert that they are frequently denied loans as they are not able to provide the financial institutions with the necessary levels of creditworthiness assurance. This study has recognized the presence of a mismatch in the SMME lending arena and highlighted the creditworthiness assessment process as an area that can contribute to the eventual resolution of this important constraint to economic development.

It has been demonstrated that the three primary bank lending technologies may not be optimally designed to reduce the inherent uncertainty behind many SMME entrepreneurial venture financing decisions. Effective Small Business Credit Scoring relies on an informative SMME owner credit history. Effective Financial Statement Lending relies on the ability of the owner to provide accurate and detailed financial information. Effective Relationship Based Lending relies on a pre-existing relationship with the SMME firm or owner. A lack of information transparency is often found amongst more nascent entrepreneurial ventures, rendering each of these lending technologies ineffective. The loans to this sector are thus declined more often as a result of uncertainty than project riskiness. The credit demand and supply mismatch is thus exacerbated.

5.3. Research objectives

The study has emphasized the inadequacies of current lending technologies when applied to a nascent market and proposed the usage of alternative creditworthiness information to assist the creditworthiness decision process. Behavioural finance insights were highlighted as being particularly appropriate to the SMME market since cognitive biases fundamentally affect the SMME entrepreneurial process. In addition, the study generated complementary creditworthiness indicators, these being financial and commercial competency, and willingness to offer collateral.

The main objectives of the study were to both originate the usage of these specific sources of information and to then investigate whether they can be practically useful within the creditworthiness decision. Evidence of creditworthiness from these alternative sources of information was correlated with evidence of creditworthiness that is currently available in the marketplace. Moreover, in order to determine pragmatic usefulness, these alternative insights needed to be accumulated easily. Data was thus generated during an actual loan application process utilizing an online questionnaire. Finally, evidence from these alternative sources of information were applied to the limitations in each of the most commonly used bank lending technologies The summarised shortcomings specific to each of the three lending technologies is presented in Table 5.1 together with the objectives of the research and the conclusions.

Table 5.1. Lending technology shortcomings and findings

Lending technology shortcomings and findings			
Lending Technology	**SA SMME Limitations**	**Research Objective**	**Key Finding**
Small Business Credit Scoring	Limited applicant credit history will yield uninformative scores on many loan applicants	Demonstrate that additional creditworthiness insights will identify more and less risky credit applicants	Additional creditworthiness information will assist in identifying more and less risky credit applicants
Financial Statement Lending	SMME applicants who are unable or unwilling to provide financial information may not be considered regardless of actual entrepreneurial prospects	Demonstrate that loan applicants with low financial sophistication are more irrational decision makers.	Nascent entrepreneurs with less financial sophistication are more irrational decision makers. Overconfident entrepreneurs make rational credit decisions
Relationship Lending	Collateral demands prevent SMME applicants with no prior bank relationships from accessing loans	Demonstrate that further insights into applicants ability and willingness to post collateral can assist the lending decision	Willingness to offer collateral is an additional though minor indicator of risky applicants, particularly where none is available.

5.4. Findings

Behavioural Finance insights offer pragmatically useful information in the creditworthiness decision process. In each of the most prominent current lending technologies, these insights seem to be able to assist the loan officer where reliance on traditional forms of information resulted in decision uncertainty. Certain of the key insights are summarised below.

5.4.1 Behavioural Finance insights and Small Business Credit Scoring

Findings of the CRP: Delphi Score correlation analyses suggested that applicants with a low credit rating will make less rational decisions in a commercial environment. This finding serves to support past research efforts where evidence of certain cognitive biases and heuristics was found to be correlated with a heightened disposition to risk taking though no findings of prior research efforts relating to specific biases were reconfirmed. The CRP: Delphi Score relationship was more evident amongst established entrepreneurs than nascent entrepreneurs. It was

extremely difficult to adequately conclude on the presence of a relationship within the nascent entrepreneurial sample due to the almost identical Delphi credit scores shared by many of the nascent applicants. Nevertheless, from the lender's perspective, the possibility of accessing an additional source of information on the loan applicant's creditworthiness (the applicant's credit score) – that has been correlated with an externally generated and somewhat relied upon credit score – is an intriguing prospect. This finding is in fact particularly useful when assessing nascent entrepreneurs who will often have a more uninformative SBCS. The loan officer is then able to make a more informed decision where previously, very little information was available.

5.4.2. Behavioural Finance insights and Financial Statement lending

Overconfidence is examined as a factor behind an entrepreneur's reluctance to present lending institutions with financial information. Overconfident entrepreneurs were found to make more regular usage of financial information. The motivation to withhold financial information from loan officers was analysed. Concerning established entrepreneurs, the incentive to provide positive information while withholding negative news was contrasted against the reluctance to include loan officers in the companies' operations by providing only limited information. Nascent entrepreneurs may also be inclined to portray an overly positive financial position though they generally will not have the resources to present it in the prescribed manner. Alternatively, overconfidence in nascent entrepreneurs may indicate the will to prepare all of the requested financial information once the resources are available.. Overconfident entrepreneurs were also more likely to make rational decisions, while regular usage of financial information on its own was not found to be an indicator of rational decision making. Where reluctance to provide banks with all of the required financial information may have been viewed as a signal of riskiness, the evidence suggests that further investigation should be considered. Screening for evidence of the Overconfidence bias amongst established entrepreneurs may thus be pragmatically useful to loan officers.

5.4.3. Alternative sources of information and Relationship Based Lending

Nascent entrepreneurs less prone to the Overconfidence bias were less willing to post collateral. Of the more irrational decision makers, those that did not possess collateral were the most willing to post collateral (*willing but unable*). Those that had collateral and were willing to offer it were less influenced by cognitive biases (*willing and able*). This gives rise to a moral hazard question where an entrepreneur has no personal exposure when applying for a loan. Where it is evident that the entrepreneur is inclined to irrational decision making, the moral hazard question becomes more evident and the bank is able to decline the loan, bypassing the information asymmetry with more certainty. The relationship vindicates the inclination of lending only where collateral is posted (the 'lazy bank syndrome'). However, the additional information may assist lending institutions seeking to reduce collateral demands. Where the shortness of the relationship does not allow for reduced security, the behavioural finance insights may circumvent the process to some extent.

5.5. Implications of the Findings

The mismatch in the SMME credit market has been suggested and presented as one largely resulting from the reliance on inappropriate creditworthiness assessment technologies. It has been demonstrated that alternative sources of lending information may considerably reduce the limitations of these lending technologies. It is thus possible to improve the flow of credit between financial institutions and the credit constrained SMME market. Key to the usefulness of alternate sources of information in the creditworthiness decision is the applicability, ease and accuracy with which it can be generated. It is here that certain implications of the findings must be considered.

5.5.1. Applicability of Behavioural Finance insights to creditworthiness

The influence of cognitive biases is a fundamental component of the entrepreneurial process. The very decision to form an enterprise is dependent on an entrepreneur's

propensity to risk taking. It may seem reasonable to assume that excessive risk taking will result in a greater likelihood of failing in business. Moderate propensity to risk taking is among the dimensions that loan officers consider interrelated to likelihood of success. The evidence revealed in this study substantiates the importance of this conviction. Certain cognitive biases – specifically Escalation of Commitment and Overconfidence, yielded significant correlations with the Delphi credit score. Chronic cognitive biases thus indicate a lack of creditworthiness.

5.5.2. Ease of accumulation of Behavioural Finance insights

The SBCS has been a largely successful indicator of SMME loan performance for several years. Financial Statement lending and Relationship based lending have also been effective lending technologies in larger and smaller firms respectively. These technologies are only effective when the information on the applicant is available. With regard to SBCS, an absence of loan applicant credit history is a severe limitation to its effectiveness. Moreover, it is impossible to create a credit history where there is none. In a similar vein, the applicant's inability to produce financial information or lack of prior exposure to a particular financial institution are not easily overcome.

The study has demonstrated that the accumulation of evidence regarding influence by cognitive biases can be performed within a commercially plausible framework. It is generally possible to generate data on the applicant's propensity to irrational decision making within reasonable time and technology limitations. In this sense, Behavioural Finance insights are more accessible than the information underpinning the traditional lending technologies. This observation must be qualified when the most remotely located entrepreneurs or those without access to basic communication or technological devices are considered. However, the traditional lending technologies are also not effective within these demographics.

5.5.3. Accuracy of Behavioural Finance insights

Findings of the study revealed that an applicant's susceptibility to any particular cognitive bias was not indicative of susceptibility to other biases. More specifically,

the tendency to irrational decision making inherent within certain applicants was not consistently applied in all decision case studies. This confirms that entrepreneurs are complex individuals faced with difficult and varied decisions. Reducing this intricacy to a simple score or rating with consistently accurate predictability is highly improbable.

Moreover, the research findings revealed large variations in score when comparing nascent to established entrepreneurs. Certain relationships emerged at a nascent entrepreneurial level (e.g. Commercial Numeracy skills and the Illusion of Control bias) that were absent at an established entrepreneurial level. In other instances (e.g. the Planning Fallacy and Overconfidence biases), amongst nascent entrepreneurs, a positive correlation was found while the opposite was true amongst established entrepreneurs. This may suggest that as the entrepreneur develops, the approach to decision making evolves though an in depth analysis of the cause of these differences is beyond the scope of the study.

The importance of stratifying the entrepreneurial between nascent and established entrepreneurs is however highlighted. The assessment of nascent entrepreneurs against established entrepreneurial information is a flaw of the current lending technologies, particularly since the nascent entrepreneur's information is not always available. Effective assessment of entrepreneurial decision making is best achieved when contrasted against information derived from similar nascent entrepreneurial sources. The classification of nascent and established entrepreneurs is subject to judgement and the assessment of propensity to rational decision making when regressing this dimension against a pool of other entrepreneurs becomes a complex exercise. Consistent and thoughtful classification of the entrepreneurial levels and specific tailoring of the lending rules and expectations is likely to result in more informative creditworthiness scoring.

5.6. Contribution to the SMME lending environment

The current SMME lending environment has been described as one where sufficient credit is available to more established firms that are not credit constrained.

Simultaneously, the smaller firms that are credit constrained are often not able to access these funds. This form of credit rationing excludes both good and bad nascent and early stage entrepreneurs. This study is amongst the first to focus on the creditworthiness assessment process as a factor inhibiting the flow of credit between the financial institutions and SMME lenders.

Moreover, the study offers a novel approach to the problem by identifying the potential usefulness of Behavioural Finance insights within the more established creditworthiness assessment methodologies. Several contributions to the fields of Economics and Finance have been made.

5.6.1 Behavioural Finance in the credit market

This study is amongst the first to link Behavioural Finance with the credit markets. Whilst other studies (few) have explored the presence of cognitive biases within credit seekers, no previous studies were found that have specifically proposed the identification and then harnessing of those insights within the creditworthiness decision. Furthermore, few studies have proposed novel approaches to the creditworthiness assessment process that could potentially reduce the constraints inhibiting the flow of credit to the SMME market, particularly those most in need of it. The possibility of funding good entrepreneurs where the previous lack of transparency precluded such an opportunity is seen as a valuable contribution.

5.6.2. A new direction in SMME commerce

The bulk of Behavioural Finance research has focused on decision making in capital markets though Behavioural Finance in SMME entrepreneurship has been amply researched in the past. Behavioural Finance is however still a relatively innovative field of exploration. Thaler (1999) stated that all future financial models will need to incorporate behavioural finance principles. This study is amongst the first to focus on the aspect of SMME financing within a Behavioural Finance framework. Lack of finance is often cited as amongst the most important problems in SMME management. Both the decision to apply for loan funding and the resulting creditworthiness decision are fundamental to the life cycle of a business. The

examination of Behavioural Finance insights within the creditworthiness assessment process is thus seen as a necessary advancement to both business management theory and Behavioural Finance theory.

5.7. Limitations

All behavioural finance and financial sophistication related data was collected on an internet questionnaire platform. The various drawbacks to the utilization of internet based questionnaires were discussed. In addition, certain operational limitations regarding the length and style of the behavioural creditworthiness questionnaire that were imposed by the lending institution did not allow for a more detailed investigation using alternative research tools. The procedures employed to maximize the objectivity, accuracy and general utility of the data collection and analyses were discussed. Prior behavioural finance research indicates that given the research objectives of this study, the research methodology employed was suitable.

While the Behavioural Finance and SMME creditworthiness principles are clearly not South African specific and past research in these areas spans many countries, country and cultural specific variables may need to be factored into the design of any research methodology or creditworthiness lending tool similar to that proposed in this study. These findings should not be assumed to be representative of entrepreneurial decision making practice in all or any other emerging economies.

The sample size was not large enough to administer comprehensive parametric statistical analyses. No similar data is currently available in South Africa to bolster the sample size of the study, nor was comparison with alternative data sources possible.

5.8. Future Research

The goal of this study was to explore the potential insights that behavioural finance insights can contribute to the current SMME creditworthiness constraints. The

research was largely descriptive and was supported by a non-parametric correlation analysis utilizing data generated from loan applicants at a recognized South African lending institution. Certain insights that emerged seem to be pragmatically useful to the loan application assessment process. Other findings were inconclusive and deserve further clarification given their importance. Further research is thus proposed in the following areas:

- The correlation between an applicant's credit rating score and the extent to which cognitive biases impact the applicant's decision making process could not be sufficiently demonstrated at the nascent entrepreneurial level. This may be primarily due to the limited credit information available to the ratings agencies when formulating a score. Further research into the existence of a relationship at the nascent level perhaps by monitoring the repayment performance of a sample of nascent entrepreneurs who have recently been granted loans would shed light on this important subject.
- The findings that emerged indicated that behavioural insights regarding nascent and established entrepreneurs differ. When using predictive scoring tools, recommendations were made that the data pools on which the regression analyses are based should be segregated between these two entrepreneurial levels. Robust empirical testing of this finding is seen as a worthwhile endeavour as the revelations that emerge may strengthen the fields of credit risk management and predictive scoring.
- Planning Fallacy and Lack of Counterfactual Thinking were both identified in past research as heuristics and cognitive biases indicative of entrepreneurial propensity to risk taking. Entrepreneurs more influenced by these (irrational) biases and heuristics are seen to be more inclined to take risks. As this research project was not able to successfully test for evidence of the Lack of Counterfactual Thinking heuristic (Paragraph 4.6), no conclusions could be drawn on the role it might play in future endeavours to reduce the uncertainty behind a creditworthiness assessment. In addition, the Planning Fallacy bias yielded evidence of correlations that often contradicted the relationships found amongst the other cognitive biases (see Paragraph 4.8.2, Paragraph 4.8.3.1, Paragraph 4.8.3.2). It is not certain whether particular behaviour unique to this

bias can explain these findings. Future research might further explore both of these variables within the creditworthiness context.

- It was determined that overconfident entrepreneurs generally make greater use of financial information. Past research indicates that SMME financial information is often of a poor quality and distorted. Whether overconfident entrepreneurs distort their financial information to improve their chances of obtaining funding for unpromising ventures, or whether the misleading financial information causes entrepreneurs to become more overconfident was not fully explored and was beyond the scope of this study. Establishing the direction of causation might be useful to the creditworthiness decision and is proposed as an area for future research.

5.9. Conclusion

Behavioural Finance insights in the creditworthiness assessment process seem to offer opportunities for both research and practical application. Several insights have been developed and explored within this study. Larger sample sizes might reveal further insights and refute others. The fundamental usefulness of the relationships that emerge would however remain. Depending on the primary lending technology and the experience that the applicant has as an entrepreneur in the venture, cognitive biases and heuristics might considerably lessen the uncertainty behind a previously unclear creditworthiness decision. Nevertheless, within the lending environment, the concepts are still some time away from commercial adoption. If acceptance of the theories evolves into practical application, the robust tools that will eventually emerge may prove extremely useful in reducing the South African SMME credit mismatch that currently exists.

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APPENDIX A

QUESTIONNAIRE

PERSONAL DETAILS:

NAME: IP1

ID NUMBER: IP2

HOME ADDRESS: IP11

TELEPHONE NUMBER: IP12

NAME OF COMPANY / CC / SOLE PROPRIETORSHIP: IP3

YEARS ACTIVELY TRADING: IP4

NUMBER OF EMPLOYEES: IP5

PROFITABLE: IP6

NO HISTORY	YES	NO

PRIMARY SECTOR (WHAT TYPE OF BUSINESS ARE YOU IN) IP7

MANUFACTURING	SERVICES	REATIL
DISTRIBUTION	**FARMING**	**HOSPITALITY**
PROPERTY	**INVESTMENTS**	**CONSTRUCTION**

WHAT IS THE IDEAL SUM YOU WOULD LIKE TO BORROW IP13

WHERE ARE YOU APPLYING FOR A LOAN IP8

DO YOU HAVE ANY PERSONAL COLLATERAL: IP9

YES	NO

ASSUMING YOU HAVE, HOW WILLING ARE YOU TO SUPPLY COLLATERAL: IP10

VERY UNWILLING	UNWILLING	UNDECIDED	WILLING	VERY WILLING
1	2	3	4	5

Case 1:

2 partners,Vusi and Lindiwe started a call centre operation in Johannesburg 3 years ago.
Vusi's cousin in America designed their softare platform and it is still the best in the market.
Their services include outsourced default account collections and telephonic market surveys.
They have a few customers including Lindiwe's uncle and some of her business contacts.
from her previous career as a sales representative for an office furniture group.
Their company is one of the only truly BEE call centre companies in South Africa.
They are starting to get enquiries about selling their services to large groups and government departments.
Vusi started up an outsourced cleaning company several years ago.
He was forced to close it because he locked himself into several unprofitable contracts.
Ultimately, he had priced his services too low.

Do you agree with the actions Vusi has taken below:

	1 Strongly disagree	2 Disagree	3 Undecided	4 Agree	5 Strongly agree	
Initial problems with the call centre software resulted in the company losing some data on a client. As a result, they could not bill the customer a fair amount of work they had performed. Vusi's cousin offers to come to South Africa for a fee to try and retrieve the data and ensure that the problem doesn't happen again. They have not had a problem since, and they have a good relationship with the customer. Vusi decides it is not worth the cost and effort.						**LC1**
The call centre agents threaten to go on strike unless they get a 10% wage increase. At his previous company, he remembers a strike action where he unsuccessfully tried to negotiate a lesser increase and lost several weeks of work. Vusi makes them an offer of 9%.						**LC2**
Lindiwe brought to Vusi's attention the fact that Vusi sent one of their customers incorrect information about their company. The company will lose face if he mentions it to the customer. There is a good chance nothing will come of it. He made an appointment with the customer and rectified the error.						**LC3**
A large and profitable tender appeared in the papers the previous month. It is Lindiwe's responsibility to screen the press for opportunities and she only noticed it after the tender had been awarded. Vusi reprimanded her severely for the missed opportunity.						**LC4**
Vusi often beats himself up over the cleaning company that he had to close down. Lindiwe tells him to move on and focus on the future. Vusi starts to write a journal of all of the errors he feels he made at the previous company so that he can avoid making all of those errors again.						**LC5**
Lindiwe discovers that Vusi made an error on the pricing of services for a customer. They are a large group who have only given a small section of their work to the company so far. Vusi sees this as an opportunity to get more of their work. He proposes to the customer that he will maintain the price if they can be awarded more of the work.						**LC6**

Answer the following questions and then rate how sure you are that you are correct:
(Confidence: 0 = no confidence, 5 = very confident)

How many people live in South Africa?

	Million									
39	42	45	48	51	54	57	60	63	66	69

TR1

Between 0 (no confidence) and 5 (fully confident), how confident are you that the above answer is correct?

0	1	2	3	4	5

OC1

How many different colours are there on the South African flag?

0	1	2	3	4	5	6	7	8	9	10

TR2

Between 0 (no confidence) and 5 (fully confident), how confident are you that the above answer is correct?

0	1	2	3	4	5

OC2

Where does South Africa currently rank in the world in terms of gold production?

0	1	2	3	4	5	6	7	8	9	10

TR3

Between 0 (no confidence) and 5 (fully confident), how confident are you that the above answer is correct?

0	1	2	3	4	5

OC3

How many foreign visitors came to South Africa in 2007?

	Million									
0	1	2	3	4	5	6	7	8	9	10

TR4

Between 0 (no confidence) and 5 (fully confident), how confident are you that the above answer is correct?

0	1	2	3	4	5

OC4

How many kilometres are there between Johannesburg and Nairobi?

	1	2	3	4	5
KM	2,922	3,219	2,543	2,752	2,886

TR5

Between 0 (no confidence) and 5 (fully confident), how confident are you that the above answer is correct?

0	1	2	3	4	5

OC5

What is the average cost of a new van in South Africa at the moment?

1	2	3	4	5
R 120,000	R 160,000	R 130,000	R 200,000	R 150,000

TR6

Between 0 (no confidence) and 5 (fully confident), how confident are you that the above answer is correct?

0	1	2	3	4	5

OC6

Case 2:

You and Alan have been partners in a tea and coffee distribution business for 1 year
You have also started roasting coffee.
The business sourced a new popular Argentinian tea product.
They brought in 1 container so far. Your agency is not exclusive.
No credit terms have been negotiated yet. All stock must be paid for upfront.
The tea expires after 9 months.
There is export potential for all the tea brands. The first container was all exported in 1 go to one customer.

Do you agree with Alan's proposed course of action:

	1	2	3	4	5	
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	
You and Alan ordered 3 containers. Since then their first customer for a whole container has decided not to take any more of the product for a few months. Your company will incur a 20% penalty for the value of changes on the supplier order. Alan wants to decrease the order?						**EC1**
Alan bought an old coffee roaster at an expensive price. A brand new one that can roast twice as quickly has just come onto the market for a limited time for less than you paid. At the moment the old machine is coping. Alan wants to buy the new machine.						**EC2**
Alan invested some extra start up money in a top share on the stock market. The investment has decreased by 15% so far. Depending who you ask, opinions vary on whether the share will bounce back or not. Alan wants to sell the shares at the loss and put the money back in the business.						**EC3**
You have decided to move to new premises. You find and pay the non-refundable deposit only to discover that the cheapest moving quote is much more than you anticipated. Alan says he prefers the new premises. He would like to move rather than lose the deposit.						**EC4**
You have been working on a new tea formula that has already taken longer than expected and occupied a lot of your time. Customers have not bought it as you have not got it right yet. You believe it will sell well when perfected. Alan wants you to put it aside and concentrate on the existing products.						**EC5**
Your company website was designed and launched 6 months ago. You spent a reasonable amount designing the site and putting in all of the e-commerce facilities. So far it has hardly generated any sales. Alan wants to add extra features to improve the usability and look.						**EC6**

Case 3:

Linda is the Managing Director of an armed guarding security company based in Cape Town.
The company has been trading for 2 years.
It was recently fully BEE accredited and may secure the contract to guard several hospitals.
Linda requires a R2 million facility from a bank.
For this contract, he must hire 500 guards and buy 500 uniforms and radios
The contract starts in 3 months

Answer the following questions as if you were an advisor to Linda.

	1 Absolutely not	2 No	3 Not sure	4 Yes	5 Absolutely yes	
Linda must choose between applying for 2 tenders next month. He will have a 35% chance of winning tender A that will yield R1,5 million profit per year and a 65% chance of winning tender B that will yield R400,000 profit a year. He has elected to apply for tender B. Do you agree with him?						**EO1**
Linda believes that the advances in technology are making radios and other guarding technology cheaper. Linda is very upbeat about these trends as he feels his company will benefit from cost savings in the future and become more profitable. Linda wants to employ a senior technology expert to research new security systems. Do you agree with him?						**EO2**
Linda has an opportunity to get his radios for 20% cheaper, but he has to order 800 at a time. He has applied for other tenders that will be judged in a few months. Should he stick with the order for 500 radios?						**EO3**
Linda generally has a 25% chance of winning big tenders. He has been offered R1 million for some of his shares in the company. He has been told that this is a fair price by his banker friend. He will still be the majority owner. Should he declined the offer because he feels that if he wins a few more tenders, his shares will be worth more.						**EO4**
Linda is one of the few truly BEE guarding businesses in the country. He was advised by friends and family to always plan 3 years ahead. He was introduced to a senior manager at the Johannesburg Stock Exchange last year. Should he fly to Johannesburg to discuss with him what factors to consider for a small listing?						**EO5**
Linda will need insurance in case his company is held liable for robberies and other accidents at his customers premises. He can opt for reasonable cover from a new insurer which is much cheaper than the very conservative cover he has, which insures against all possible accidents. He has not had to claim for anything big yet. Should he stick with the old cover?						**EO6**

Case 4

Harold and Peter are partners in a steel building supply manufacturer.
They bought the business 10 years ago together with machinery and designs.
Steel is becoming less fashionable & more expensive. Aluminium demand may take over.
Start-up costs in this business are quite significant.
The business has an established customer base.
Peter must voice his opinion on some of Harold's proposals at a management meeting.

As Peter, do you agree with Harold's proposed courses of action:

	1 Strongly disagree	2 Disagree	3 Undecided	4 Agree	5 Strongly agree	
Harold feels that several competitors will go bankrupt with the current slowdown in the building industry. The company urgently needs to upgrade several machines. Harold wants to wait as he thinks he will find some bargains at bankruptcy auctions soon.						**IC1**
The company often takes foreign currency forward cover on its importing of stock. Harold has worked out that the Rand should not weaken for the next 2 months. He does not want to take cover now to pay for next months order.						**IC2**
Harold predicts that the demand for aluminium will exceed steel within 3 years. He correctly predicted that timber demand would fall a few years ago. He is not willing to invest in an aluminium plant until he has seen orders for steel dropping off significantly.						**IC3**
Sales of galvanized steel always increase in the rainy season. Harold reckons that this year will be a very rainy season and wants to increase stock of galvanized products by 20% more than last years levels.						**IC4**
Harold got a large window frame order on a government tender last year. He partnered with a well connected company to win the job. He feels the company's frames are good quality and competitively priced. He plans to retain more of the profit in future by tendering without the well connected company in future.						**IC5**
Harold wants to import a new handle from an untested supplier. He has been successful before in terms of the quality he needed from all of his other supplier. He needs to order immediately to secure an old price before the annual increases. He would rather forego the old price and order samples now for testing.						**IC6**

Case 5

Jack and his sons Rob and Eric are partners in a small truck manufacturing and repair company. They have been trading for 4 years.
They need R3 million to secure orders for a new non-exclusive Chinese truck brand. The trucks will be shipped to South Africa in kit form and assembled at a workshop.
To be viable, they must be able to manufacture a truck within 2 weeks per assembler.
They have 1 qualified manufacturer and some apprentices.
They will need some new manufacturing equipment to speed up manufacturing.
They have repaired but never manufactured trucks from kit form before.

State to what extent you agree with Rob's opinion on the plans of action below:

	1	2	3	4	5	
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	
After only receiving a R1 million bank loan, Jack tells Rob that they will have to build the trucks in half the time. He doesn't think it is workable and would rather stick to truck repairs. Rob thinks that with extra training and more workers, they will manage and wants to place the first order for kit-form trucks now. Do you agree with Rob?						**PF1**
With the lesser loan amount, they may struggle to pay all of the current wage costs. Some of the workers are occasionally idle at the moment though no trucks have been received from China yet. Jack doesn't want to retrench anyone while Rob thinks they will manage with a few less workers. Do you agree with Rob?						**PF2**
The Chinese manufacturing company would like to inspect their premises. They would like to come in 2 months time. Jack does not want to postpone them for fear of losing their confidence but the plant and machinery is not all in place. If everything goes to plan, the assembly plant will all be ready in time. Rob would like to tell them to rather come in 3 months time. Do you agree with Rob?						**PF3**
Rob wants to focus all marketing on the local market for the first year at least. Jack wants to spend a little extra money on marketing to fast-track a countrywide awareness of the brand more quickly. Do you agree with Rob?						**PF4**

They are expecting 8 trucks to arrive in 1 week. Rob has been asked to organize a launch of the new brand. The most imprtnat thing is that the launch must be in 3 weeks time and cannot be delayed any longer. He must do everything himself and will have no help from anyone else in the company.

	1	2	3	4	5	
	Strongly disagree	Disagree	Don't know but carry on with the plan	Agree	Strongly agree	
Eric suggests that you launch a competition for all of the potential truck buyers in the region, arrange sponsorship of 1 truck from the overseas company and get the event televised. Rob would rather create a list of all potential truck buyers in the region, post them an invitation to a cocktail and have a 2 hour demonstration of the trucks capabilities. Do you agree with Rob?						**PF5**
Jack suggest that you have pamphlets made up and advertise in a local trucking magazine. Rob would rather introduce the truck at Kyalami with a stunt driver followed by truck racing around the track and a cocktail party at Kyalami Castle. Do you agree with Rob?						**PF6**

Case 6

Floor Tiling (Pty) Ltd manufacture tiles for the lower end market.
They sell all of the products by the metre^2.
They normally recost their products once a year and issue letters to their customers advising them.
Their most popular range is Alpino and is to be found in many RDP housing projects.
The market is very price sensitive.
You are one of the directors and are sitting in the meeting to recalculate the selling price of Alpino

Read each item and suggest the selling price of Alpino:

The raw material currently costs R50 per metre^2. You know you will make a good profit if you sell at double the cost of the raw material.

1	2	3	4	5	
R 80	R 90	R 100	R 110	R 120	
					EX1

Labour and overhead costs work out at R30 per metre^2. You would like to grow the market of the Alpino tiles.

1	2	3	4	5	
R 70	R 80	R 95	R 110	R 120	
					EX2

A major developer has told you that one of your competitors is aggresively trying to get their business. They ask you to do a special deal for them just for the next month.

1	2	3	4	5	
R 70	R 75	R 80	R 90	R 100	
					EX3

You pay a rebate to all of your major customers of 5% at the end of the year based on total sales for the year.

1	2	3	4	5	
R 75	R 80	R 85	R 90	R 95	
					EX4

You have been notified that the cost of raw materials is going to increase in 1 months time by an extra R5 per metre^2. The cost of labour will go up in 2 months time by R5 per metre^2.

1	2	3	4	5	
R 85	R 90	R 95	R 100	R 105	
					EX5

How important are each of the factors below to your decision to set the selling price:

	1	2	3	4	5	
	Totally unimportant	Not important	Undecided	Important	Extremely important	
Major competitors pricing						**FR1**
Your transport costs						**FR2**
Your raw material costs						**FR3**
Interest rates						**FR4**
Your service levels						**FR5**
Your share of the market						**FR6**
Economic factors						**FR7**
Last years prices						**FR8**

Rate the extent to which you utilize the following when the occasion calls for it:

	1 Never	2 Rare	3 Occassional	4 Often	5 All the time	
A full-time / part-time bookkeeper						**FS1**
A full-time / part-time accountant						**FS2**
Written strategy plans						**FS3**
Regular planning sessions						**FS4**
Gut - feel about a financial decision that has to be made						**FS5**
Computerized accounting software						**FS6**
A business consultant						**FS7**
Formal internal controls around debtors, creditors and stock						**FS8**
An accountant / auditor						**FS9**
Monthly reporting Income statements						**FS10**
Balance Sheets						**FS11**
Cashflow statements						**FS12**
Formal written budgets						**FS13**
Discounted cashflows evaluations						**FS14**
Cashflow forecasting						**FS15**
Bank reconcilliations						**FS16**
Formal product costing exercises						**FS17**
Watching cash balances						**FS18**
Reading the financial press						**FS19**
Preparation of audited financial statements						**FS20**

Rate the usefulness of each of the following as financial management tools:

	1 Don't know what it is	2 Not useful	3 Occassionally useful	4 Generally helpful	5 Critical to running my business	
A full-time / part-time bookkeeper						FS21
A full-time / part-time accountant						FS22
Written strategy plans						FS23
Regular planning sessions						FS24
Gut - feel about a financial decision that has to be made						FS25
Computerized accounting software						FS26
A business consultant						FS27
Formal internal controls around debtors, creditors and stock						FS28
An accountant / auditor						FS29
Monthly reporting						
Income statements						FS30
Balance Sheets						FS31
Cashflow statements						FS32
Formal written budgets						FS33
Discounted cashflows evaluations						FS34
Cashflow forecasting						FS35
Bank reconcilliations						FS36
Formal product costing exercises						FS37
Watching cash balances						FS38
Reading the financial press						FS39
Preparation of audited financial statements						FS40

APPENDIX B

QUESTION ASSESSMENT

Question Design

Wording problem

1 Ambiguous
2 Complex
3 Double-barrelled
4 Short question
5 Technical jargon
6 Uncommon word
7 Vague word

Missing or inadequate data for intended purpose

8 Belief vs behaviour
9 Starting time
10 Data degradation
11 Insensitive measure

Faulty scale

12 Forced choice
13 Missing interval
14 Overlapping interval
15 Scale format

Leading questions

16 Framing
17 Leading question
18 Mind-set

Intrusiveness

19 Reporting
20 Sensitive question

Inconsistency

21 Case definition
22 Change of scale
23 Change of wording
24 Classification vogue

Questionnaire Design

Formatting problem

25 Horizontal response format
26 Juxtaposed scale
27 Left or right alignment

Questionnaire too long

28 No-saying / yes-saying
29 Open-ended question
30 Response fatigue

Flawed questionnaire structure

31 Skipping questions

Administration of Questionnaire

Interviewer not objective

32 Interviewer
33 Nonblinding

Respondent's subconscious reaction

34 End aversion
35 Positive satisfaction

Respondent's conscious reaction

36 Faking bad
37 Faking good
38 Unacceptable trait
39 Unacceptable behaviour
40 Unacceptability
41 Underlying cause

Respondent's learning

42 Learning
43 Hypothesis guessing

Respondent's inaccurate recall

44 Primary and recency
45 Proxy respondent
46 Recall
47 Telescope

Cultural differences

48 Cultural